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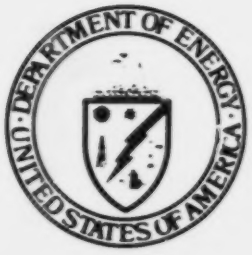
Status of Coal Supply Contracts for New Electric Generating Units

1977-1986

First Annual Supplement

U.S. Department of Energy
Federal Energy Regulatory Commission
Office of Electric Power Regulation



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Status of Coal Supply Contracts for New Electric Generating Units

1977-1986

First Annual Supplement

U.S. Department of Energy
Federal Energy Regulatory Commission
Office of Electric Power Regulation
Washington, D.C. 20426

May 1978

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Preface

In January 1977, the former Federal Power Commission issued the first report with this title, 1/ covering the period from 1976 through 1985, based on a 1976 informal survey of electric utilties with announced plans to construct coal-fired generating units. The report focused on the extent to which the additional coal supplies needed by the new plants were under contract, and on the supply patterns exhibited by the contracts.

A similar informal survey was made late in 1977, to determine progress in contracting, to include new or revised utility plans and to see how supply patterns may be changing. This report is based on the second survey.

The Federal Energy Regulatory Commission functions are predominantly regulatory and the Commission requires an understanding of industry trends as background for its decisions. The economics of fuel supply for electric power has become a regulatory issue of major concern in recent years. This report was prepared by the FERC staff as part of its continuing analyses of electric power economic issues. It is made available to the public because of general interest in the subject.

With establishment of the new Department of Energy, other elements of the Department of Energy are now responsible for electric power supply and reliability and for making general energy information available to the public.

1/ FPC Bureau of Power Staff Report, "Status of Coal Supply Contracts for New Electric Generating Units 1976-1985"

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STATUS OF COAL SUPPLY CONTRACTS FOR NEW ELECTRIC GENERATING UNITS 1977-1986

FIRST ANNUAL SUPPLEMENT 2/

Introduction

An annual survey of the status of contracting for the coal requirements of new electric generating plants can be useful in determining adequacy of supply, changing patterns of sources and transportation modes, impacts of new laws, fuel effects on electricity prices, potential problem areas and other factors of interest.

In 1977, electric utilities again reduced their projections of the rate of future load growth and adjusted their plans for new generating units accordingly. The national ten-year average annual growth in electric energy demand projected by the industry in 1977 was 5.8 percent per year, down from its 1976 projection of 6.2 percent per year. 3/ The industry's 1977 projection of its coal demand by 1985 was .3 percent lower than that made a year earlier.

With the continuing modifications of utility forward plans, the coal supply patterns which will actually exist in the late 1980s may be substantially different from those projected a decade earlier. Consequently, there is a need to revise the coal supply forecast periodically to reflect changes in utility plans.

The amounts of coal which will be needed by electric utilities in 1985 and 1986 cannot be precisely forecast. They will depend on the percentage of new coal-fired units actually completed on schedule, what their utilizations will be (capacity factors), and on the heating values of the coals used. In this year's report, the projections of the generation mix and coal demand are those of the utilities; the projections for 1981 and 1986 are shown in Table 1. The generation mix and overall coal demand projections used in last year's report were somewhat lower than those forecast by the utilities at that time

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2/ This report was prepared by the following staff members of the Energy and Fuels Analyses Branch, Division of Interconnections and Systems Analysis: Hilary R. Salkov, Statistician; John J. Pyrdol, Industry Economist; Hugh Stewart, General Engineer: Abdul Dasti, Chemical Engineer; and Alex Gakner, Branch Chief.

3/ FPC Bureau of Power Staff Report, "Electric Power Supply and Demand 1977-1986", May 16, 1977.

because of staff's belief that the industry projections were slightly high. 4/ Any difference in total coal demand projections would not affect the figures developed for percentages of new demand under contract, percentages from various source regions, and other parameters, since in both years the figures relate to the nominal coal requirements of the identified new coal units which are assumed to be completed on schedule. In any event, this study is not primarily concerned with projections of consumption; they are listed here for reference only.

Some additional information is included in this year's report. The largest suppliers of coal for the new units are identified. Also, sulfur emission control strategies are listed for units to be completed by 1981.

For ease of use, most of the relevant general discussion contained in last year's report is repeated in this year's report.

Table 1
PROJECTED GENERATION MIX
1981 AND 1986
IN BILLION KILOWATT-HOURS 5/

Type Generation	1976 Actual		1981		1986	
	10^9 kwh	%	10^9 kwh	%	10^9 kwh	%
Coal	944	46.3	1294	47.7	1698	47.7
Oil	320	15.7	480	17.7	520	14.6
Gas	294	14.4	178	6.6	100	2.8
Nuclear	191	9.4	516	19.0	990	27.8
Hydro	284	13.9	232*	8.5	231*	6.5
Other	4	0.3	14	0.5	24	0.6
Total	2037	100.0	2714	100.0	3563	100.0

* Assumes adverse hydro conditions.
Calculated: Hydro + pumped storage output - pumped storage load.

4/ The responsibility for preparing Power Surveys and generation projections within the DOE now resides with the Energy Information Administration (EIA); at the time of this report the most recent EIA forecasts of the utility generation mix and fuel requirements were not available.

5/ Actual data for 1976 from FPC News Release No. 23017, March 23, 1977; 1981 and 1986 projections from NERC, "Fossil and Nuclear Fuel for Electric Utility Generation, Requirements and Constraints, 1977-1986." August 1977.

Summary

At the beginning of 1977, electric utilities were planning to bring into service over the next ten years (1977-1986) 260 new coal-fired generating units. By the end of 1986, the coal demand of these new units will be 415 million tons a year. Traditionally, utilities have met about four-fifths of their coal requirements with contractual arrangements, most of which are of long-term duration, reflecting the need for assured supplies of uniform coal over the lifetime of the unit. Because of the large sizes of modern coal-fired units, usually requiring a million tons of coal a year or more, in most cases a new mine will be established specifically to serve the needs of a particular generating unit or station. Such mining additions require several years to construct, and substantial investments by the mining firms. Consequently, the timely execution of long-term coal supply contracts by the utilities is a key requirement in assuring that their coal needs will be met. Such firm contracts are also essential for adequate planning of the coal transportation system.

The trend in the electric utility industry has been towards meeting all or most of the coal requirements for the large new coal-fired units with long-term contracts, however, short-term contracts and spot purchases will continue to form an important part of utility coal supply. Most large utilities find short-term contracts and spot purchases useful to supplement long-term, firm supplies to deal with the uncertainties of future coal requirements. This flexibility is desirable to avoid penalty payments associated with "take-or-pay" provisions of long-term contracts, as well as to take advantage of favorable coal market conditions. Occasionally, because of pending environmental control regulations utilities are unable to make any firm, long-term commitments.

A comparison of this year's data (dealing with new coal-fired units scheduled for initial operation during the period 1977 through 1986) with last year's data (covering new units with scheduled start-ups in the period of 1976 through 1985) reflects the continuing increase in planned coal-fired generation and some shifts in the patterns of steam coal demand and supply identified last year. There was some decrease in the percent of ten-year coal requirements under contract, indicating a slackening of forward contracting in 1977.

- Last year's study listed 229 new coal-fired units with a total capacity of 111,573 megawatts (MW) scheduled to come on-line during the ten years 1976 through 1985; this year's report lists 260 new units with a total capacity of 135,146 MW coming on-line during the ten years 1977 through 1986.

- Of the total 111,573 MW of new coal-fired capacity identified in the report last year, 58.8 percent was to be sited west of the Mississippi River; this year's reports show a more even distribution of the 10-year capacity additions with 52.6 percent to be sited in the West. This is principally because about two-thirds of the new coal-fired capacity additions identified for the first time on this year's report were east of the Mississippi.

- Last year's report identified a 10-year incremental coal demand for the new units of 357.8 million annual tons by the end of the ten year period under review (1985); 67.9 percent of this coal was under contract. This year's report identifies a 10-year incremental coal demand of 414.9 million tons annually by the end of the period being surveyed (1986); 63.0 percent of this coal is presently under contract.

- Last year's study projected more than half (54 percent) of the listed new capacity to come on-line during the first half of the period under review. This year's report shows more of the listed capacity coming on-line in the later years of ten year period; 49 percent of the listed new capacity was projected to come on-line during the first half of the ten years. This shift in the distribution of the listed units towards later start-up dates in this report may partly explain the small reduction in percentage of coal under contract and the greater tonnage of incremental coal listed as having an unknown source in this report, as compared to last year.

- As in the year earlier survey, coal mines located west of the Mississippi River will be the sources for most of the coal going to the new units. Seventy percent of the incremental coal last year and sixty-six percent of the incremental coal in this year's report was projected to come from the West. The decrease in emphasis on Western coal may signal a significant trend, but the trend cannot be confirmed by a single year. The degree to which Western coal will be emphasized for future electric power generation will depend on the development of new coal-fired capacity in the West which would

naturally rely on Western coal, and the effect of the Clean Air Act Amendments which will tend to reduce the attractiveness of low-sulfur estern coals in eastern areas.

- The railroads were again reported to be the major mode of coal transportation with slightly over 60 percent of all the incremental coal projected to be moved by rail in both studies. Last year's report identified 47.1 percent of the 10-year new plant coal requirements as having transportation assured (all modes) by contract or other binding agreement for 1985; this year 49.9 percent of the 10-year requirements had transportation assured for 1986.

Appendix 11 identifies the initial new capacity listed in last year's report, subsequent cancellations and additions, the change in the percentage of coal under contract, and net capacity changes for the new units coming on-line in 1977-1985 time period, which is the common time period for both reports.

Table 2

REGIONAL COAL DEMAND FOR
NEW UNITS SCHEDULED FOR SERVICE 1977-1986

Destination	1976 Shipments to Utilities (1000 Tons)	1986 (End of Year) Total Demand For New Units (1000 Tons)	(%)	Quantities Assured For New Units (1000 Tons)	% Assured
Eastern Regions					
New England	753	-	-	-	-
Middle Atlantic	45,683	21,127	(5.1)	4,300	20.4
East North Central	147,840	57,842	(13.9)	33,698	58.3
South Atlantic	85,388	35,943	(8.7)	13,065	36.3
East South Central	66,097	32,726	(7.9)	9,974	30.5
Sub-Total	345,761	147,638	(35.6)	61,037	41.3
Western Regions					
West North Central	52,617	71,024	(17.1)	49,663	69.9
West South Central	13,370	131,790	(31.8)	104,523	79.3
Mountain	39,511	59,035	(14.2)	42,955	72.8
Pacific	3,600	5,400	(1.3)	3,300	61.1
Sub-Total	109,098	267,249	(64.4)	200,441	75.0
Total	454,859*/	414,887	(100.0)	261,478	63.0

*/ Of the 454.9 million tons of coal delivered to utilities in 1976, 448 million tons were consumed; 6.9 million tons were added to stocks. The future coal requirements of existing units will change during the next 10 years. The extent of the change will be determined by such things as changes in capacity factors, unit up- or de-ratings, retirements, and the effect of the Federal program to convert power plants from oil and gas to coal.

Note: See Appendix 1 for map of U. S. Geographic Regions.

As of October 1977, the utilities had 63 percent (261.5 million tons) of the incremental coal demand for the new units under contract. As can be seen from Table 2 the quantities of coal which are assured by contract vary from region to region. In the East, 41.3 percent of the coal requirements for 1986 are presently under contract; in the West, where a larger share of the new coal-fired units is scheduled to become operational in the first half of the ten year period under review, 75.0 percent of the 1986 coal demand for new

units is already under contract. The West South Central and Mountain Regions have the highest levels of assured supplies with 79.3 percent and 72.8 percent assured for 1986, respectively. In these regions a smaller number of coal suppliers gives the utilities fewer supply alternatives, and a large number of utilities are developing their own coal resources (captive coal) to supply their new coal-fired units.

Contrary to traditional patterns of coal supply, most of the coal for the new units will be produced in the Western States. As Table 3 shows, the Northern Great Plains (173.2 million tons) and the Rocky Mountain States (49.4 million tons) will account for more than half of all the coal going to the new units through 1986. The demand for coal from Bureau of Mines District 15 (most of which is Texas lignite) is projected to reach 52.6 million tons by the end of 1986. The proportion of the coal supply assured by contract varies widely in the different supply regions from a low of 41.3 percent assured in Appalachia to 85.1 percent of the coal supply assured from BOM District 15 (most of which is captive coal).

The average length of coal contracts varies from an average of 34.4 years for coal from BOM District 15, to 27.7 years for Western coal, and 18.8 years for coal produced east of the Mississippi.

Table 3

SOURCES OF COAL FOR
NEW UNITS SCHEDULED FOR SERVICE 1977-1986

Source	1976 Shipments to Utilities (1000 Tons)	1986 (End of Year) Total Demand For New Units (1000 Tons)	(%)	Quantities Assured For New Units (1000 Tons)	% Assured
Appalachia	216,665	55,521	(13.4)	22,953	41.3
Interior Basin	122,998	31,188	(7.5)	21,145	67.8
Bureau of Mines District 15 (Texas, Kansas, Missouri, Oklahoma)	20,743	52,560	(12.7)	44,715	85.1
Northern Great Plains	64,371*	173,176	(41.7)	135,132	78.0
Rockies	29,016	49,433	(11.9)	37,533	75.9
Unknown	-	53,009	(12.8)	0	-
Total	453,793**	414,887	(100.0)	261,478	63.0

* Includes 3.6 million tons of coal produced in the state of Washington.
** Does not include imported coal.

Note; See Appendix 2 for map of coal producing areas in the U. S.

The coal for the new generating units which has been assured by contract will be supplied by 57 suppliers nationwide. Coal companies owned or controlled by oil companies will supply 38.7 percent of the contracted coal. Captive operations will account for another 34.3 percent of this coal. Of the 57 suppliers, the 4 largest will supply 35.1 percent of the contracted coal while the top 8 firms will supply 53.1 percent. The concentration ratios vary widely from Appalachia with a 4 firm concentration ratio of 40.0 percent to BOM District 15 where the top 4 firms will supply 97.8 percent of the contracted coal.

As can be seen from Table 4 the railroads will continue to hold their dominant position in the transportation of coal with about two-thirds of the coal to be delivered to new generating units scheduled to move by rail. However, as of October 1977, only 39.5 percent of the projected 1986 rail movements had established rail tariff schedules. All of the other modes of coal transport (e.g. barge, truck, collier, pipeline, and belt) are assured by contract or other binding agreement to a much higher degree in 1986.

Table 4

PRINCIPAL MODE OF COAL TRANSPORT
TO NEW UNITS
1981 AND 1986

1981

Mode of Transport	Total Coal Demand		Coal with Assured Mode of Transport	
	Quantity (1000 Tons)	% of Total Coal Demand	Quantity (1000 Tons)	% of Total Demand By Mode of Transport
	(1)	(2)	(3)	(4) = (3)/(1) x 100
Railroad	133360	63.1	78783	59.1
Barge	17976	8.5	15369	85.5
Truck	51367	24.3	47467	92.4
Collier	0	0.0	0	0.0
Pipeline	0	0.0	0	0.0
Belt	8793	4.2	5960	67.8
Unknown	0	0.0	0	0.0
Total 1981	211496	100.0	147579	69.8

1986

Railroad	258199	62.2	102090	39.5
Barge	29666	7.2	21772	73.4
Truck	67709	16.3	59409	87.7
Collier	4250	1.0	4000	94.1
Pipeline	8686	2.1	8686	100.0
Belt	16825	4.1	11160	66.3
Unknown	29552	7.1	0	0.0
Total 1986	414887	100.0	207117	49.9

Data from FPC Form 67 identifies the strategy for compliance with applicable sulfur oxide emission standards for the new units coming on-line during the 1977-1981 period. As shown in Table 5, 134 coal-fired units with a total capacity of 66,210 MW are scheduled for operation during this five year period. Seventy-two units, or 56.3 percent of the total 66,210 megawatts of new capacity, intend to meet their standards with low-sulfur coal; sixty-one units, or 43.2 percent of the total, are planning on using a flue gas desulfurization process (FGD) to comply with standards; less than one percent of the new capacity for the 1977-1981 time period is as yet undecided on a compliance strategy.

Table 5

STRATEGIES FOR COMPLIANCE WITH SULFUR OXIDE EMISSION REGULATIONS, COAL-FIRED UNITS, 1977-1981*

Low-Sulfur Coal Strategy		Flue Gas Desulfurization Strategy		Unknown Strategy		Total	
No. of Units	Capacity (MW)	No. of Units	Capacity (MW)	No. of Units	Capacity (MW)	No. of Units	Capacity (MW)
72	37,279	61	28,601	1	330	134	66,210

* New Source Performance Standards (NSPS) or State Implementation Plans (SIP's), which ever is stricter.

Data identifying the compliance strategy of plants to be completed after 1981 are not available. Because of the Clean Air Act Amendments, there may be substantial shifts in strategy for these later plants.

During the year since the previous survey, utilities added supply contracts sufficient to maintain about the same time distribution of forward contracting. For example, in 1976, 83.9 percent of the 1980 new coal requirements were under contract; in 1977 the 1980 requirements

under contract had risen to 90 percent and the 1981 figure was 84.5 percent. With allowance for the cancellation of certain units, the contract coverage for new-plant cumulative coal requirements through 1985 rose from 67 percent in the 1976 survey to 76 percent in the 1977 survey.

Methodology

In response to FPC Order 383-4, electric utilities, through their respective Reliability Councils, report their plans for new capacity additions by fuel type for a period of ten years into the future. The data is categorized by month and year in which the new capacity is expected to come on-stream. The electric utilities also report on FPC Form 67, Part III, expected capacity additions five and ten years into the future, the projected fuel use for new units, and the quality and the sources of the fuel. The basic data for this study was obtained by the five Regional Offices of the FERC which contacted all utilities reporting coal-fired capacity additions coming on-line from 1977 through 1986 to confirm and update the information in their Order 383-4 and Form 67 reports, with special attention to the Form 67 information on coal demand and sources of supply for new coal-fired units coming on-line through 1986. They also identified the quantity of coal for the new units having a supply contract (as of October 1977), the suppliers of the coal under contract, the anticipated primary mode of transportation for this coal, and how much of the transportation was assured (as of October 1977) by a separate contract or an established tariff.

Annual Coal Demand for New Units, 1977-1986

The updated information on new coal-fired units scheduled for operation from 1977 to 1986 and their projected coal requirements obtained from the FERC's regional offices is summarized, by state and geographic region, in Table 6. It shows that as of October 1977 the electric utilities plan to add 134 new units with a total capacity of 66,210 megawatts (MW) from 1977 through 1981. The national average unit size planned for this 5 year period will be 494 MW. By 1981 the average annual coal requirement will be 3.19 tons per kilowatt of new capacity, reflecting both a high plant factor for the new coal-fired capacity and a lower average heat content of the coal to be used by the new units.

From 1982 through 1986 an additional 126 units totaling 68,935 MW are projected to come on-line. The average size of these units will be 547 MW. The average coal requirements for these units will be 2.95 tons per kilowatt of capacity. For the entire ten year period 1977 through 1986, 260 units are scheduled for operation with an average size of 520 MW and an average coal demand of 3.07 tons per kilowatt of capacity.

Table 6 also shows, by state and geographic region, the total 1981 and 1986 coal demand by the new units and the proportion of that demand already under contract (as of October 1977). Thus, in 1981, 83.1 percent of the projected 1981 coal demand of 211.5 million tons for new units is assured by contract. For 1986, 63.0 percent of the total 414.9 million tons projected to go to the new units is under contract.

There are significant regional differences in the proportion of the total coal demand for new units already under contract. Generally, new units in the West show much higher levels of coal assured by contract than new units being sited east of the Mississippi River. The major factors appearing to cause this trend are:

* the extensive development of captive coal production in the West

* the smaller number of suppliers and less developed coal production capacity in the West necessitating earlier committments to supply contracts

* a higher degree of confidence on the part of Eastern utilities regarding the availability of excess mine capacity in Appalachia and the future supply of Appalachian coal

Table 6

COAL REQUIREMENTS FOR NEW COAL UNITS
SCHEDULED FOR OPERATION BETWEEN 1977-1986

STATE AND GEOGRAPHIC REGION	NEW COAL UNITS SCHEDULED FOR OPERATION BETWEEN 1977-1981 NO. OF UNITS	CAPACITY (MW)	INCREMENTAL COAL DEMAND IN 1981 (1000 TONS)	QUANTITY ASSURED BY CONTRACT (1000 TONS)	% OF DEMAND	TOTAL NEW COAL UNITS SCHEDULED FOR OPERATION BETWEEN 1977-1986 NO. OF UNITS	CAPACITY (MW)	TOTAL INCREMENTAL COAL DEMAND IN 1986 (1000 TONS)	QUANTITY ASSURED BY CONTRACT (1000 TONS)	% OF DEMAND
CONN	0	-	-	-	-	0	-	-	-	-
ME	0	-	-	-	-	0	-	-	-	-
MASS	0	-	-	-	-	0	-	-	-	-
N H	0	-	-	-	-	0	-	-	-	-
R I	0	-	-	-	-	0	-	-	-	-
VT	0	-	-	-	-	0	-	-	-	-
NEW ENGLAND REGIONAL TOTAL	0	-	-	-	-	0	-	-	-	-
N Y	0	0	0	0	0.0	3	2400	6827	0	0.0
P A	3	2284	6000	4300	71.7	8	5774	14300	4300	30.1
N J	0	-	-	-	-	0	-	-	-	-
MID ATLANTIC REGIONAL TOTAL	3	2284	6000	4300	71.7	11	8174	21127	4300	20.4
ILL	5	1985	4030	1675	41.6	9	3585	8012	2675	33.4
IND	8	4890	13992	9792	70.0	12	7620	22956	13584	59.6
MICH	4	1040	2724	1140	41.9	10	3379	8524	4995	58.2
OHIO	4	2199	4300	3400	79.1	7	3609	6750	4250	63.0
WISC	3	1457	4200	4200	100.0	9	3837	12100	6150	51.2
EAST NORTH CENTRAL REGIONAL TOTAL	24	11571	29300	20227	69.0	47	22430	57842	33698	58.3
IA	6	2311	7296	5340	73.2	8	3151	9746	5340	54.8
KAN	4	2225	7283	6683	91.8	8	4105	12505	10250	82.0
MINN	3	2080	6900	4400	63.8	6	4600	16000	4400	27.5
MO	4	2405	6900	5400	78.3	6	2955	8000	5290	65.6
NEB	4	1875	6365	6010	94.5	4	1875	6673	6323	94.8
N D	5	2178	13400	13400	100.0	7	2988	10100	10100	100.0
S D	0	-	-	-	-	0	-	-	-	-
WEST NORTH CENTRAL REGIONAL TOTAL	26	13074	48148	41242	85.7	39	19674	71024	49683	69.9
DELA	1	400	800	0	0.0	1	400	800	0	0.0
FLOR	2	595	1404	0	0.0	8	3826	7364	0	0.0
GA	2	1671	3351	2351	100.0	8	5615	12771	8751	68.5
MD	0	0	0	0	0.0	1	800	1500	0	0.0
N C	1	720	1410	1410	100.0	3	2160	4314	4314	100.0
S C	1	280	463	463	100.0	5	1690	2654	0	0.0
W VA	3	2552	6500	0	0.0	3	2552	6500	0	0.0
D C	0	-	-	-	-	0	-	-	-	-
V A	0	-	-	-	-	0	-	-	-	-
SOUTH ATLANTIC REGIONAL TOTAL	10	6218	13988	5224	37.3	29	17343	35643	13065	36.9
ALA	4	1744	2652	452	18.4	10	6272	9800	800	8.1
KY	9	3512	9510	4860	51.1	15	7260	16658	6638	39.8
MISS	4	1300	1970	1970	100.0	6	2969	6268	2736	43.7
TENN	0	-	-	-	-	0	-	-	-	-
EAST SOUTH CENTRAL REGIONAL TOTAL	17	7022	13932	7282	52.3	31	16049	32728	9574	30.5
ARK	2	1220	4460	4460	100.0	6	3820	11710	12560	88.1
LA	2	1080	4000	4000	100.0	8	4205	15611	9817	62.9
OKLA	7	3450	11946	10946	84.1	13	6210	15901	9001	45.2
TEX	20	11396	49651	49651	100.0	32	18677	81560	72745	89.2
WEST SOUTH CENTRAL REGIONAL TOTAL	31	17154	70057	68157	97.3	59	32920	131790	104523	79.3
ARIZ	7	2000	5815	5815	100.0	9	2705	7535	5615	74.5
COLO	4	1440	5020	5020	100.0	10	3754	12687	5927	46.7
MONT	1	700	2833	2833	100.0	2	1400	5665	5665	100.0
NEV	1	250	700	0	0.0	4	1500	7170	5770	80.5
N M	2	532	3917	3917	100.0	3	1432	6234	4034	64.7
UTAH	3	1215	2400	2400	100.0	8	3335	9116	5316	58.3
WYO	4	1800	8172	8172	100.0	5	2300	10020	10020	100.0
MOUNTAIN REGIONAL TOTAL	22	8387	28885	28185	97.6	41	16456	59035	42955	72.8
CALF	0	0	0	0	0.0	2	1000	4200	2100	50.0
ORE	1	500	1200	1200	100.0	1	500	1200	1200	100.0
WASH	0	-	-	-	-	0	-	-	-	-
PACIFIC REGIONAL TOTAL	1	500	1200	1200	100.0	3	2100	5400	3300	61.1
U.S. TOTAL	134	66210	211490	175797	83.1	260	135146	434887	281478	63.0

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* the tendency on the part of some Eastern utilities to postpone committing to a long term supply contract in the face of uncertainties about future state air pollution control regulations for sulfur oxides. The alternatives often being to burn low sulfur western coal versus burning higher sulfur eastern coals with a flue gas desulfurization system

Utility responses to FPC Order 383-4 include information on the month and year the new units are projected to begin operation. With this information it was possible to estimate the annual cummulative and the annual incremental coal demand of the new units coming on-line from 1977 through 1986. These estimates are shown in Table 7 and Table 8, respectively. In preparing these two tables the unit coal requirements in the year in which the unit is scheduled to come on-stream were prorated in proportion to the number of months the unit is expected to be in operation during the initial year.

Table 7

ESTIMATED ANNUAL CUMULATIVE COAL DEMAND OF NEW UNITS, 1977-1986

Year	Cumulative Demand (1000 Tons)	Quantity Under Contract (1000 Tons)	Percent Under Contract (%)
1977	20,544	20,544	100.0
1978	62,095	61,045	98.3
1979	98,087	91,844	93.6
1980	147,224	132,550	90.0
1981	195,202	164,863	84.5
1982	228,927	188,550	82.4
1983	260,457	205,473	78.9
1984	294,797	221,850	75.3
1985	344,963	242,837	70.4
1986	405,111	258,907	63.9
Annual Demand Rate at End of 1986	414,887	261,478	63.0

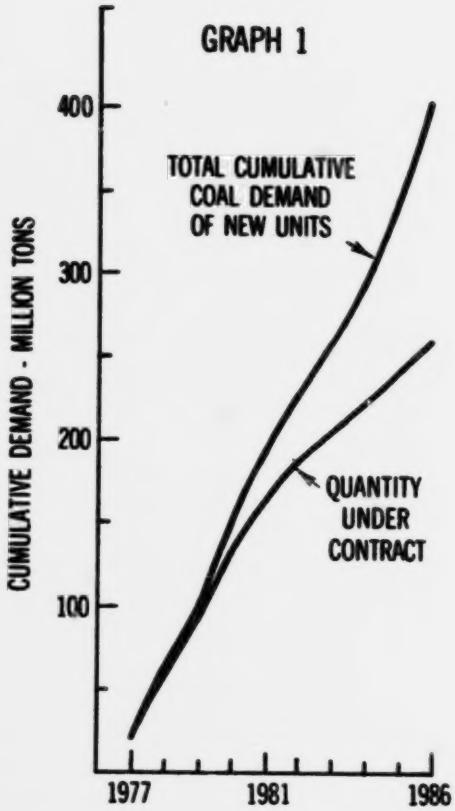
Table 8

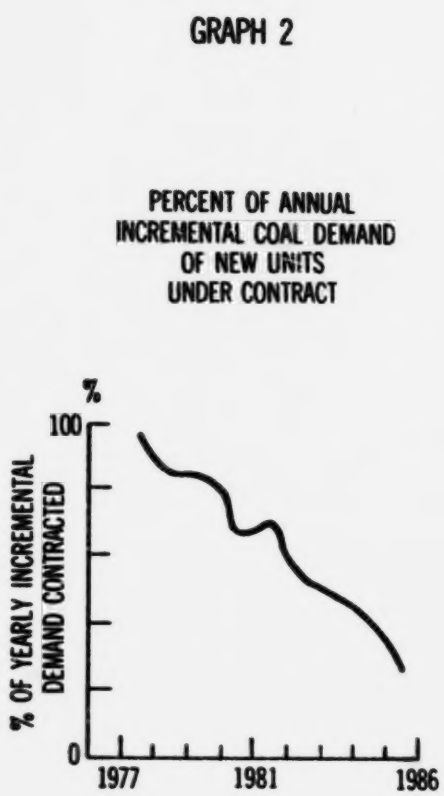
ESTIMATED ANNUAL INCREMENTAL COAL DEMAND OF NEW UNITS, 1977-1986

Year	Incremental Demand (1000 Tons)	Quantity Under Contract (1000 Tons)	Percent Under Contract (%)
1977-78	41,551	40,501	97.5
1978-79	35,992	30,799	85.6
1979-80	49,137	40,706	82.8
1980-81	47,978	32,313	67.3
1981-82	33,725	23,687	70.2
1982-83	31,530	16,923	53.7
1983-84	33,590	16,377	48.9
1984-85	50,916	20,987	41.2
1985-86	60,148	16,070	26.7

The data contained in Tables 7 and 8 are represented graphically in graphs 1 and 2.

Graph 1 shows the total cumulative coal demand of the new units and the portion of that demand which is under contract for each of the ten years from 1977 to 1986. Graph 2 shows the percentage of the annual incremental coal demand of new units which is under contract. As expected, the portions of the total annual cumulative and annual incremental demand under contract become smaller towards the end of the ten year period.





Origin and Destination of Coal for New Units

Of the national total of 135,146 megawatts of new coal-fired capacity scheduled for operation from 1977 through 1986, 52.6 percent will be located in states west of the Mississippi River. Practically all of the new units in the West will be depending on bituminous and sub-bituminous coal and lignite produced west of the Mississippi. Thus, 92.1 percent of the incremental coal produced in the West will go to new units in the West. Because of the lower average heating value of Western coals, the new units in the West will use more than their proportionate share of the incremental coal tonnage, i.e. 52.6 percent of the new capacity coming on-line 1977-1986 will require 64.4 percent of the total incremental tonnage.

Table 9 identifies the origin (by Bureau of Mines coal producing district[6]) of the 1981 and 1986 coal requirements for new units and the states receiving that coal. Table 10 shows the destination (state and geographic region[7]) -by-origin (BOM coal producing district) of the 1981 and 1986 coal demand for new units, as well as the proportion of that demand assured by contract.

The western regions of the Northern Great Plains (NGP)[8] will be the largest producing region for the incremental steam coal supplies going to new units in the next ten years. Of the 414.9 million tons of incremental coal demand, 155.1 million tons, or 37.4 percent, will come from this region. In comparison, only 12.0 percent of the coal delivered to electric utilities in 1976 came from this region. As a result of this large incremental demand for coal from the western regions of the NGP this area will account for approximately one-quarter of all the coal used by the utility industry in 1986. Most of the incremental coal to be produced in the region in the next ten years is destined for new units in other sections of the country. As can be seen from Figure 1 only 16.3 million tons produced in this area will be consumed within the region. The West South Central Region will receive 72.8 million tons of the total 155.1 million tons, while 44.1 million tons will go to the West North Central Region. In 1986 incremental coal production from the western part of the NGP going to states east of the Mississippi River will include 12.7 million tons to the East North Central Region and 2.8 million tons to the state of Mississippi.

The Mountain Region[9] will supply 49.4 million tons, or 11.9 percent, of the 1986 coal requirements for new coal-fired units. In 1976, 6.4 percent of the coal delivered to electric utilities came from the Mountain Region. Slightly more than half of the 49.4 million tons of incremental production will stay within the area; much of this tonnage will be consumed at mine-mouth plants. California will receive 4.2 million tons of coal from the Mountain states. Pacific Gas and Electric is planning to bring two coal-fired units on-line in California (800 MW each) in 1984 and 1985, respectively. These units will be the first coal-fired generating units in the state. At least half of the 4.2 million tons will be supplied by PG&E's captive coal mine in Utah.

6/ A definition of bituminous coal and lignite producing districts is given in Appendix 3.

7/ The geographic divisions of the U. S. are shown in Appendix 1.

8/ The western regions of the Northern Great Plains include Wyoming and Montana.

9/ Colorado, Utah, Arizona and New Mexico.

The demand for coal from Bureau of Mines District 15 (Kansas, Texas, Missouri, and part of Oklahoma) will grow rapidly in the next ten years. BOM District 15 will supply 12.7 percent of the incremental coal demand for new units by 1986, as compared to 4.6 percent of the 1976 coal deliveries to utilities. As indicated in Figure 2, all of the incremental coal produced in BOM District 15 will be consumed by new units within the area. Virtually all of this will be lignite mined and consumed in Texas.

The Appalachian Region has historically been the primary source of electric utility steam coal. In 1976, 47.8 percent of all the coal delivered to electric utilities came from Appalachia. However, only 13.4 percent of the coal requirements for the new units scheduled for operation from 1977-1986 is projected to come from Appalachia. By 1986, Appalachia will still be the largest overall source of coal for the utilities, but its share of the steam coal market will have dropped to about 30 percent. The incremental coal supplies from Appalachia for new units will all stay east of the Mississippi River, the traditional market areas for Appalachian coal.

Along with the Appalachian Region the Eastern Region of the Interior Province (see Figure 3) is projected to have the lowest growth rate in the demand for its coal. As indicated in Table 11, Appalachia and the Eastern Region of the Interior Province will be losing some of their shares of the steam coal market.

The Fort Union Region in the Dakotas will continue to be a relatively small source of lignite for steam generation accounting for 4.4 percent of the 1986 incremental coal demand for new units. Due to its low heating value lignite 10/ is uneconomical to transport long distances, therefore practically all the lignite produced in the Fort Union Region is moved by truck or conveyor belt and consumed in plants near the mines.

10/ Lignite averages 6,300-8,300 Btu's per pound compared to subbituminous which ranges from 8,300-10,500 Btu's per pound and bituminous which averages 10,500-14,000 Btu's per pound.

Table 9

Origin-Destination of Coal for New Units, 1981 and 1986

BOM DISTRICT (ORIGIN)	STATE OF DESTINATION	TOTAL DEMAND (1000 TONS)	1981 ASSURED QUANTITY	% ASSURED	TOTAL DEMAND (1000 TONS)	1986 ASSURED QUANTITY	% ASSURED
UNKNOWN	ALA	0	0	0.0	5200	0	0.0
UNKNOWN	ARIZ	0	0	0.0	1920	0	0.0
UNKNOWN	ARK	0	0	0.0	1750	0	0.0
UNKNOWN	COLO	0	0	0.0	900	0	0.0
UNKNOWN	FLOR	400	0	0.0	4500	0	0.0
UNKNOWN	GA	0	0	0.0	3600	0	0.0
UNKNOWN	ILL	290	0	0.0	950	0	0.0
UNKNOWN	IND	1500	0	0.0	2300	0	0.0
UNKNOWN	IOWA	0	0	0.0	2000	0	0.0
UNKNOWN	KAN	0	0	0.0	815	0	0.0
UNKNOWN	KY	1000	0	0.0	4020	0	0.0
UNKNOWN	MD	0	0	0.0	1500	0	0.0
UNKNOWN	MICH	0	0	0.0	1720	0	0.0
UNKNOWN	MISS	0	0	0.0	732	0	0.0
UNKNOWN	MO	0	0	0.0	1250	0	0.0
UNKNOWN	N Y	0	0	0.0	4827	0	0.0
UNKNOWN	OKLA	0	0	0.0	4500	0	0.0
UNKNOWN	PA	0	0	0.0	1980	0	0.0
UNKNOWN	S C	0	0	0.0	2225	0	0.0
UNKNOWN	WISC	0	0	0.0	4400	0	0.0
BOM DISTRICT	0 TOTALS	3390	0	0.0	53009	0	0.0
1	DEL	300	0	0.0	300	0	0.0
1	PA	1300	1300	100.0	3200	1300	40.6
BOM DISTRICT	1 TOTALS	1600	1300	81.3	3500	1300	37.1
2	PA	0	0	0.0	4500	0	0.0
BOM DISTRICT	2 TOTALS	0	0	0.0	4500	0	0.0
3	W VA	3000	0	0.0	3000	0	0.0
BOM DISTRICT	3 TOTALS	3000	0	0.0	3000	0	0.0
4	OHIO	750	750	100.0	2350	750	31.9
4	PA	4700	3000	63.8	4700	3000	63.8
BOM DISTRICT	4 TOTALS	5450	3750	68.8	7050	3750	53.2
8	DEL	500	0	0.0	500	0	0.0
8	GA	2117	2117	100.0	7737	7517	97.2
8	ILL	350	185	53.0	0	0	0.0
8	KY	4160	1460	35.1	5750	700	12.2
8	MICH	1785	161	9.0	1865	0	0.0
8	MISS	506	506	100.0	1272	1272	100.0
8	N C	1410	1410	100.0	4314	4314	100.0
8	OHIO	3550	2650	74.6	4400	3500	79.5
8	S C	463	463	100.0	469	0	0.0
8	W VA	3500	0	0.0	3500	0	0.0
BOM DISTRICT	8 TOTALS	18341	8952	48.8	29807	17303	58.1
9	KY	3980	3010	76.0	6588	5638	85.6
9	MISS	1464	1464	100.0	1464	1464	100.0
BOM DISTRICT	9 TOTALS	5424	4474	82.5	8052	7102	88.2
10	GA	317	317	100.0	317	317	100.0
10	ILL	3398	1490	44.0	7062	2675	37.9
10	IND	4842	2692	66.6	4216	2844	68.0
10	LA	0	0	0.0	194	0	0.0
10	MC	3400	3400	100.0	3250	3250	100.0
BOM DISTRICT	10 TOTALS	11149	7899	70.8	15039	9108	60.6
11	GA	917	917	100.0	917	917	100.0
11	IND	3950	2600	65.8	6888	3718	54.0
11	KY	390	390	100.0	300	300	100.0
BOM DISTRICT	11 TOTALS	5257	3907	74.3	8097	4935	60.9
13	ALA	2452	452	18.4	4600	600	13.0
13	FLOR	864	0	0.0	2864	0	0.0
13	GA	0	0	0.0	200	0	0.0
BOM DISTRICT	13 TOTALS	3316	452	13.6	7664	600	7.8
15	MO	1900	0	0.0	1500	0	0.0
15	TEX	29765	29765	100.0	51068	44715	87.6
BOM DISTRICT	15 TOTALS	31265	29765	95.2	52568	44715	85.1

Table 9 (Continued)

BOR DISTRICT (ORIGIN)	STATE OF DESTINATION	TOTAL DEMAND (1000 TONS)	1981 ASSURED QUANTITY	% ASSURED	TOTAL DEMAND (1000 TONS)	1986 ASSURED QUANTITY	% ASSURED
16	COLO	2400	2400	100.0	4800	2400	50.0
BOR DISTRICT 16 TOTALS		2400	2400	100.0	4800	2400	50.0
17	COLO	899	899	100.0	1798	1798	100.0
17	TEX	1500	1500	100.0	1500	1500	100.0
BOR DISTRICT 17 TOTALS		2399	2399	100.0	3298	3298	100.0
18	ARIZ	4865	4865	100.0	5615	5615	100.0
18	N M	3917	3917	100.0	6234	4034	64.7
BOR DISTRICT 18 TOTALS		8782	8782	100.0	11849	9649	81.4
19	ARK	4460	4460	100.0	12960	12960	100.0
19	COLO	1729	1729	100.0	5189	1729	33.3
19	IOWA	7296	5340	73.2	7296	5340	73.2
19	KAN	7283	6683	91.8	11690	10250	87.7
19	LA	0	0	0.0	9417	3817	40.5
19	MINN	0	0	0.0	3100	0	0.0
19	MISS	0	0	0.0	2800	0	0.0
19	MO	2000	2000	100.0	2000	2000	100.0
19	NEB	6369	6019	94.5	6673	6323	94.8
19	OKLA	11946	10046	84.1	15401	9001	58.4
19	ORE	1200	1200	100.0	1200	1200	100.0
19	TEX	9266	9266	100.0	14338	11860	82.7
19	WISC	2500	2500	100.0	6000	4490	74.8
19	WYO	8172	8172	100.0	10628	10628	100.0
BOR DISTRICT 19 TOTALS		62221	57415	92.3	108692	79598	73.2
20	ARIZ	950	950	100.0	0	0	0.0
20	CA	0	0	0.0	4200	2100	50.0
20	IND	4500	4500	100.0	9000	9000	100.0
20	NEV	700	0	0.0	7170	5770	80.5
20	UTAH	2400	2400	100.0	9116	5316	58.3
BOR DISTRICT 20 TOTALS		8550	7850	91.8	29486	22186	75.2
21	N D	13400	13400	100.0	18100	18100	100.0
BOR DISTRICT 21 TOTALS		13400	13400	100.0	18100	18100	100.0
22	IOWA	0	0	0.0	450	0	0.0
22	LA	4000	4000	100.0	6000	6000	100.0
22	MICH	999	999	100.0	4999	4999	100.0
22	MINN	6900	4400	63.8	12900	4400	34.1
22	MONT	2833	2833	100.0	5665	5665	100.0
22	TEX	9120	9120	100.0	14670	14670	100.0
22	WISC	1700	1700	100.0	1700	1700	100.0
BOR DISTRICT 22 TOTALS		25552	23052	90.2	46384	37434	80.7
UNITED STATES TOTALS		211496	175797	83.1	414987	261478	63.0

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Table 10

Destination-Origin of Coal for New Units, 1981 and 1986

REGION AND STATE OF DESTINATION	FCM DISTRICT (ORIGIN)	1981 TOTAL DEMAND (1000 TONS)	1981 ASSURED QUANTITY	1981 % ASSURED	1986 TOTAL DEMAND (1000 TONS)	1986 ASSURED QUANTITY	1986 % ASSURED
N Y	3	0	0	0.0	6827	0	0.0
STATE TOTALS FOR N Y		0	0	0.0	6827	0	0.0
PA	0	0	0	0.0	1900	0	0.0
PA	1	1300	1300	100.0	3200	1300	40.6
PA	2	0	0	0.0	4500	0	0.0
PA	4	4700	3000	63.8	4700	3000	63.8
STATE TOTALS FOR PA		6000	4300	71.7	14300	4300	30.1
MIDDLE ATLANTIC REGION		6000	4300	71.7	21127	4300	20.4
ILL	0	290	0	0.0	950	0	0.0
ILL	8	350	185	53.0	0	0	0.0
ILL	10	3390	1490	44.0	7062	2675	37.9
STATE TOTALS FOR ILL		4030	1675	41.6	8012	2675	33.4
IND	0	1500	0	0.0	2300	0	0.0
IND	10	4042	2692	66.6	4216	2866	68.0
IND	11	3950	2600	65.8	6880	3718	54.0
IND	20	4500	4500	100.0	9000	9000	100.0
STATE TOTALS FOR IND		13992	9792	70.0	22396	15584	69.6
MICH	0	0	0	0.0	1720	0	0.0
MICH	8	1785	161	9.0	1865	0	0.0
MICH	22	999	999	100.0	4999	4999	100.0
STATE TOTALS FOR MICH		2784	1160	41.6	8584	4999	58.2
OHIO	4	750	750	100.0	2350	750	31.9
OHIO	8	3550	2650	74.6	4400	3500	79.5
STATE TOTALS FOR OHIO		4300	3400	79.1	6750	4250	63.0
WISC	0	0	0	0.0	4400	0	0.0
WISC	19	2500	2500	100.0	6000	4490	74.8
WISC	22	1700	1700	100.0	1700	1700	100.0
STATE TOTALS FOR WISC		4200	4200	100.0	12100	6190	51.2
EAST NORTH CENTRAL REGION		29306	20227	69.0	57842	33698	58.3
IOWA	0	0	0	0.0	2000	0	0.0
IOWA	19	7296	5340	73.2	7296	5340	73.2
IOWA	22	0	0	0.0	450	0	0.0
STATE TOTALS FOR IOWA		7296	5340	73.2	9746	5340	54.8
KAN	0	0	0	0.0	815	0	0.0
KAN	19	7283	6683	91.8	11690	10250	87.7
STATE TOTALS FOR KAN		7283	6683	91.8	12505	10250	82.0
MINN	19	0	0	0.0	3100	0	0.0
MINN	22	6900	4400	63.8	12900	4400	34.1
STATE TOTALS FOR MINN		6900	4400	63.8	16000	4400	27.5
MO	0	0	0	0.0	1250	0	0.0
MO	10	3400	3400	100.0	3250	3250	100.0
MO	15	1500	0	0.0	1500	0	0.0
MO	19	2000	2000	100.0	2000	2000	100.0
STATE TOTALS FOR MO		6900	5400	78.3	8000	5250	65.6
NEB	19	6369	6019	94.5	6673	6323	94.8
STATE TOTALS FOR NEB		6369	6019	94.5	6673	6323	94.8
N D	21	13400	13400	100.0	18100	18100	100.0
STATE TOTALS FOR N D		13400	13400	100.0	18100	18100	100.0
WEST NORTH CENTRAL REGION		48148	41242	85.7	71024	49663	69.9

Table 10 (Continued)

REGION AND STATE OF DESTINATION	BCP DISTRICT (ORIGIN)	1981 TOTAL DEMAND (1000 TONS)	1981 ASSURED QUANTITY	1981 % ASSURED	1986 TOTAL DEMAND (1000 TONS)	1986 ASSURED QUANTITY	1986 % ASSURED
DEL	1	300	0	0.0	300	0	0.0
DEL	8	500	0	0.0	500	0	0.0
STATE TOTALS FOR DEL		800	0	0.0	800	0	0.0
FLOR	0	600	0	0.0	4500	0	0.0
FLOR	13	864	0	0.0	2864	0	0.0
STATE TOTALS FOR FLOR		1464	0	0.0	7364	0	0.0
GA	0	0	0	0.0	3800	0	0.0
GA	8	2117	2117	100.0	7737	7517	97.2
GA	10	317	317	100.0	317	317	100.0
GA	11	917	917	100.0	917	917	100.0
GA	13	0	0	0.0	200	0	0.0
STATE TOTALS FOR GA		3351	3351	100.0	12771	8751	68.5
MD	0	0	0	0.0	1500	0	0.0
STATE TOTALS FOR MD		0	0	0.0	1500	0	0.0
N C	8	1410	1410	100.0	4314	4314	100.0
STATE TOTALS FOR N C		1410	1410	100.0	4314	4314	100.0
S C	0	0	0	0.0	2225	0	0.0
S C	8	463	463	100.0	469	0	0.0
STATE TOTALS FOR S C		463	463	100.0	2694	0	0.0
W VA	3	3000	0	0.0	3000	0	0.0
W VA	8	3500	0	0.0	3500	0	0.0
STATE TOTALS FOR W VA		6500	0	0.0	6500	0	0.0
SOUTH ATLANTIC REGION		13988	5224	37.3	35943	13065	36.3
ALA	0	0	0	0.0	5200	0	0.0
ALA	13	2452	452	18.4	4800	600	13.0
STATE TOTALS FOR ALA		2452	452	18.4	9800	600	6.1
KY	0	1000	0	0.0	4020	0	0.0
KY	8	4160	1460	35.1	5750	700	12.2
KY	9	3960	3010	76.0	6588	5638	85.6
KY	11	390	390	100.0	300	300	100.0
STATE TOTALS FOR KY		9510	4860	51.1	16658	6638	39.8
MISS	0	0	0	0.0	732	0	0.0
MISS	8	506	506	100.0	1272	1272	100.0
MISS	9	1464	1464	100.0	1464	1464	100.0
MISS	19	0	0	0.0	2800	0	0.0
STATE TOTALS FOR MISS		1970	1970	100.0	6268	2736	43.7
EAST SOUTH CENTRAL REGION		13932	7282	52.3	32726	9974	30.5
ARK	0	0	0	0.0	1750	0	0.0
ARK	19	4460	4460	100.0	12960	12960	100.0
STATE TOTALS FOR ARK		4460	4460	100.0	14710	12960	88.1
LA	10	0	0	0.0	194	0	0.0
LA	19	0	0	0.0	9417	3817	40.5
LA	22	4000	4000	100.0	6000	6000	100.0
STATE TOTALS FOR LA		4000	4000	100.0	15611	9817	62.9
OKLA	0	0	0	0.0	4500	0	0.0
OKLA	19	11946	10046	84.1	15401	9001	58.4
STATE TOTALS FOR OKLA		11946	10046	84.1	19901	9001	45.2
TEX	15	29765	29765	100.0	51060	44715	87.6
TEX	17	1500	1500	100.0	1500	1500	100.0
TEX	19	9266	9266	100.0	14338	11886	82.7
TEX	22	9120	9120	100.0	14670	14670	100.0
STATE TOTALS FOR TEX		49651	49651	100.0	81568	72745	89.2
WEST SOUTH CENTRAL REGION		70057	68157	97.3	131790	104523	79.3

Table 10 (Continued)

REGION AND STATE OF DESTINATION	BOM DISTRICT (ORIGIN)	TOTAL DEMAND (1000 TONS)	1981 ASSURED QUANTITY	% ASSURED	TOTAL DEMAND (1000 TONS)	1986 ASSURED QUANTITY	% ASSURED
ARIZ	0	0	0	0.0	1920	0	0.0
ARIZ	18	4865	4865	100.0	5615	5615	100.0
ARIZ	20	950	950	100.0	0	0	0.0
STATE TOTALS FOR ARIZ		5815	5815	100.0	7535	5615	74.5
COLO	0	0	0	0.0	900	0	0.0
COLO	16	2400	2400	100.0	4800	2400	50.0
COLO	17	899	899	100.0	1798	1798	100.0
COLO	19	1729	1729	100.0	5189	1729	33.3
STATE TOTALS FOR COLO		5028	5028	100.0	12687	5927	46.7
MONT	22	2833	2833	100.0	5665	5665	100.0
STATE TOTALS FOR MONT		2833	2833	100.0	5665	5665	100.0
NEV	20	700	0	0.0	7170	5770	80.5
STATE TOTALS FOR NEV		700	0	0.0	7170	5770	80.5
N M	18	3917	3917	100.0	6234	4034	64.7
STATE TOTALS FOR N M		3917	3917	100.0	6234	4034	64.7
UTAH	20	2400	2400	100.0	9116	5316	58.3
STATE TOTALS FOR UTAH		2400	2400	100.0	9116	5316	58.3
WYO	19	8172	8172	100.0	10628	10628	100.0
STATE TOTALS FOR WYO		8172	8172	100.0	10628	10628	100.0
MOUNTAIN REGION		28865	28165	97.6	59035	42955	72.8
CA	20	0	0	0.0	4200	2100	50.0
STATE TOTALS FOR CA		0	0	0.0	4200	2100	50.0
ORE	19	1200	1200	100.0	1200	1200	100.0
STATE TOTALS FOR ORE		1200	1200	100.0	1200	1200	100.0
PACIFIC REGION		1200	1200	100.0	5400	3300	61.1
UNITED STATES TOTALS		211496	175797	83.1	414887	261478	63.0

Table 11

TRENDS IN ELECTRIC UTILITY STEAM COAL SUPPLIES, BY PRODUCING REGION

	Share of 1976 Steam Coal Market (Actual)*	Share of 1986 Steam Coal Market (Projected)
Appalachia	47.8%	31.4%
Eastern Region of Interior Province	27.0%	17.7%
Bureau of Mines District 15	4.6%	8.4%
Western Regions of Northern Great Plains	12.0% **	24.1%
Fort Union Region	2.2%	3.2%
Mountain Region	6.4%	9.0%
Unknown	-	6.2%
TOTAL	100.0%	100.0%

* Based on Federal Power Commission Form 423 data.

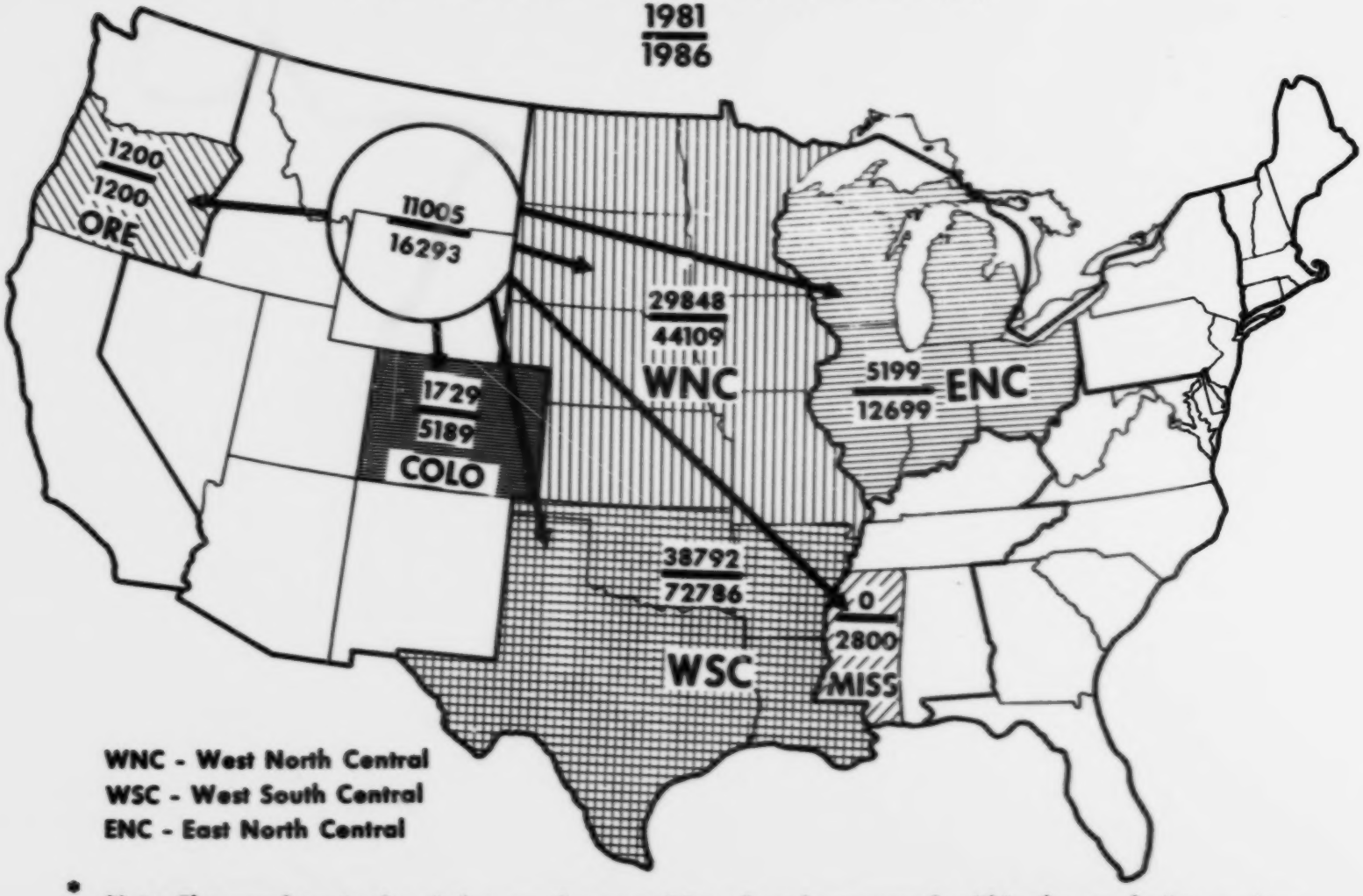
** Includes 3.6 million tons of coal produced in the state of Washington.

NOTE: The projected market shares were estimated by adding the 1977-1986 incremental demand for new units to the actual 1976 deliveries of coal to the utilities. This estimate assumes any shifts in the 1976 supply patterns to be minor. Retirements, upratings, deratings, conversions from oil or gas to coal, and shifts in coal requirements by some units operating in 1976 due to environmental control considerations will probably balance each other out.

Figure 1 24

FLOW OF COAL TO NEW GENERATING UNITS FROM THE WESTERN REGIONS OF THE NORTHERN GREAT PLAINS (IN 1000 TONS)*

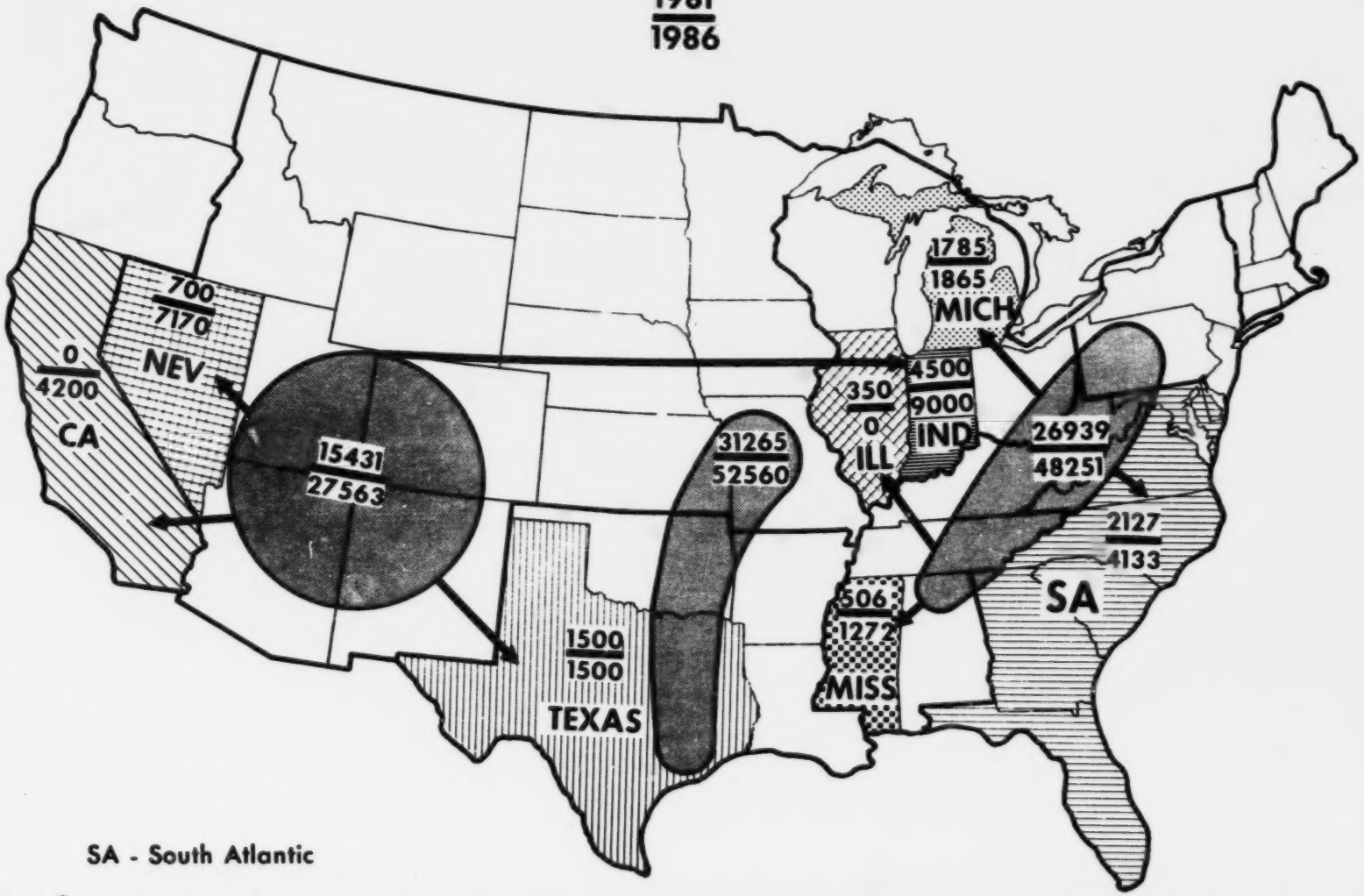
1981
1986



* Note: The numbers in the circles are the quantities of coal consumed within the producing regions.

Figure 2

FLOW OF COAL TO NEW GENERATING UNITS FROM THE APPALACHIAN REGION, FROM U.S. BUREAU OF MINES DISTRICT 15, AND FROM THE MOUNTAIN REGION (IN 1000 TONS)*

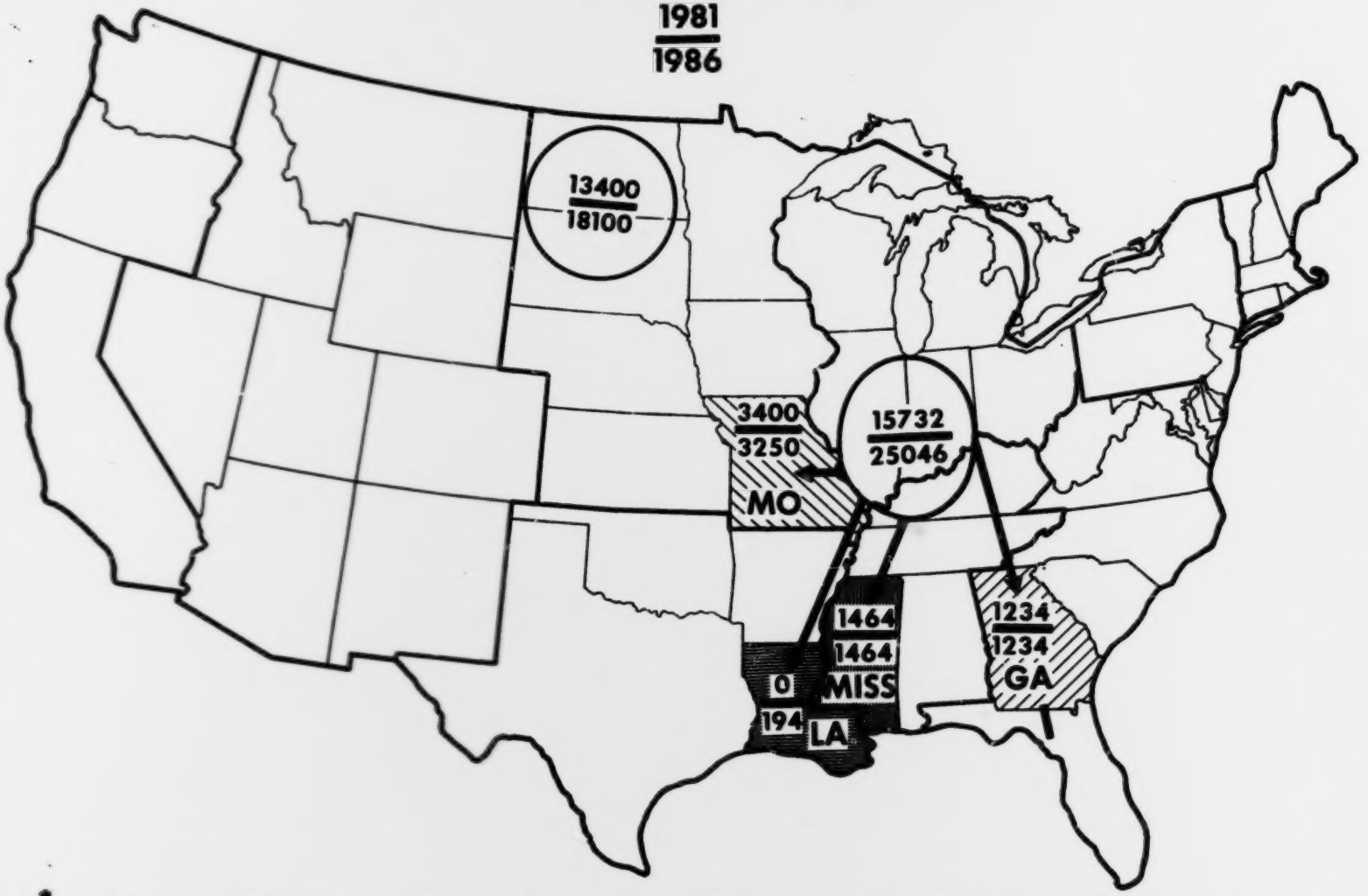


SA - South Atlantic

* Note: The numbers in the circles are the quantities of coal consumed within the producing regions.

Figure 3 26

FLOW OF COAL TO NEW GENERATING UNITS FROM THE EASTERN REGION (INTERIOR PROVINCE) AND THE FORT UNION REGION (IN 1000 TONS)*



* Note: The numbers in the circles are the quantities of coal consumed within the producing regions.

Coal Suppliers for the New Units

The staff has been able to identify the suppliers of the 258.9 million tons 11/ of coal under contract, as of October 1977, for delivery to the new units in 1986. The contracted coal will be provided by fifty-seven suppliers. Of the 258.9 million tons under contract, 38.7 percent will be supplied by companies owned or controlled by oil companies. It is anticipated that captive coal operations will supply another 34.3 percent of the 258.9 million tons. 12/ The remaining 27.0 percent will be supplied by independent coal producers. Table 12 lists the twenty largest suppliers and the tonnages they will supply to the new units.

Nation-wide the 4-firm and 8-firm concentration ratios 13/ for all the incremental steam coal suppliers are 35.1 percent and 53.1 percent, respectively. When captive suppliers are excluded the 4-firm concentration ratio goes up to 44.6 percent, and the 8-firm concentration ratio goes up to 67.2 percent.

Table 13 identifies the concentration ratios nation-wide and in the major coal producing regions for all the incremental coal suppliers and for all suppliers excluding the captive sources.

11/ The 258.9 million tons is the tonnage under contract which will actually be delivered in 1986. In other places in this publication we refer to 261.5 million tons under contract by the end of 1986 which is based on the annual rate at which the new units will consume coal.

12/ Communications with the utilities planning captive operations to supply their new unit coal requirements indicate that they anticipate producing the captive tonnages identified but that there may be some shortfalls in this production which will have to be covered by coal supplies from non-captive sources.

13/ Concentration ratios measure the percentage of total supply which is produced by the firm or firms in question. Similar data is not available for the contemporary electric utilty steam coal market which made it impossible to draw any conclusions as to the concentration trends in electric utility steam coal supplies.

Table 12

TWENTY LARGEST SUPPLIERS OF COAL TO NEW COAL-FIRED UNITS SCHEDULED FOR OPERATION FROM 1977-1986

		Quantity in 10^3 Tons	Percent of Total
1.	Texas Utilities (captive)	30,120	11.6
2.	Amax * #	26,189	10.1
3.	Shell Oil Co. *	18,670	7.2
4.	Peabody Coal Co.	15,981	6.2
5.	ARCO *	14,960	5.8
6.	North American Coal Corp.	11,350	4.4
7.	Kerr-McGee *	11,040	4.3
8.	Indiana-Michigan Elec. Co. (captive)	9,000	3.5
9.	Utah International Inc.	8,383	3.2
10.	Exxon *	7,689	3.0
11.	Sun Oil Co. *	7,650	2.9
12.	Decker Coal Co.	6,000	2.3
13.	Brazos Elec. Coop. (captive)	6,000	2.3
14.	Montana Power Co. (captive)	5,665	2.2
15.	Montana-Dakota Utilities (captive)	4,400	1.7
16.	Basin Electric Coop. (captive)	4,368	1.7
17.	Nevada Power Co. (captive)	4,190	1.6
18.	Old Ben Coal Co. *	3,675	1.4
19.	Pennsylvania Power Co. (captive)	3,000	1.2
20.	Southwestern Electric Power (captive)	2,800	1.1
	Sub-Total	201,130	77.7
	Other	57,768	22.3
	Total Assured (1986)	258,898 **	

* Operations owned or controlled by oil companies. Oil companies will account for 100,072 thousand tons of the total 258,898 thousand tons presently assured for 1986.

** Includes 88,790 thousand tons of captive coal.

\# Standard Oil of California owns 20.6 percent of Amax stock.

Sources: Bureau of Mines IC8719, "Projects to Expand Fuel Sources, 1976; Wyoming Geologic Survey; Federal Energy Administration, Office of Coal (Now part of Department of Energy), Washington, D.C.; Technical Press; Contacts with the Electric Utilities.

Table 13

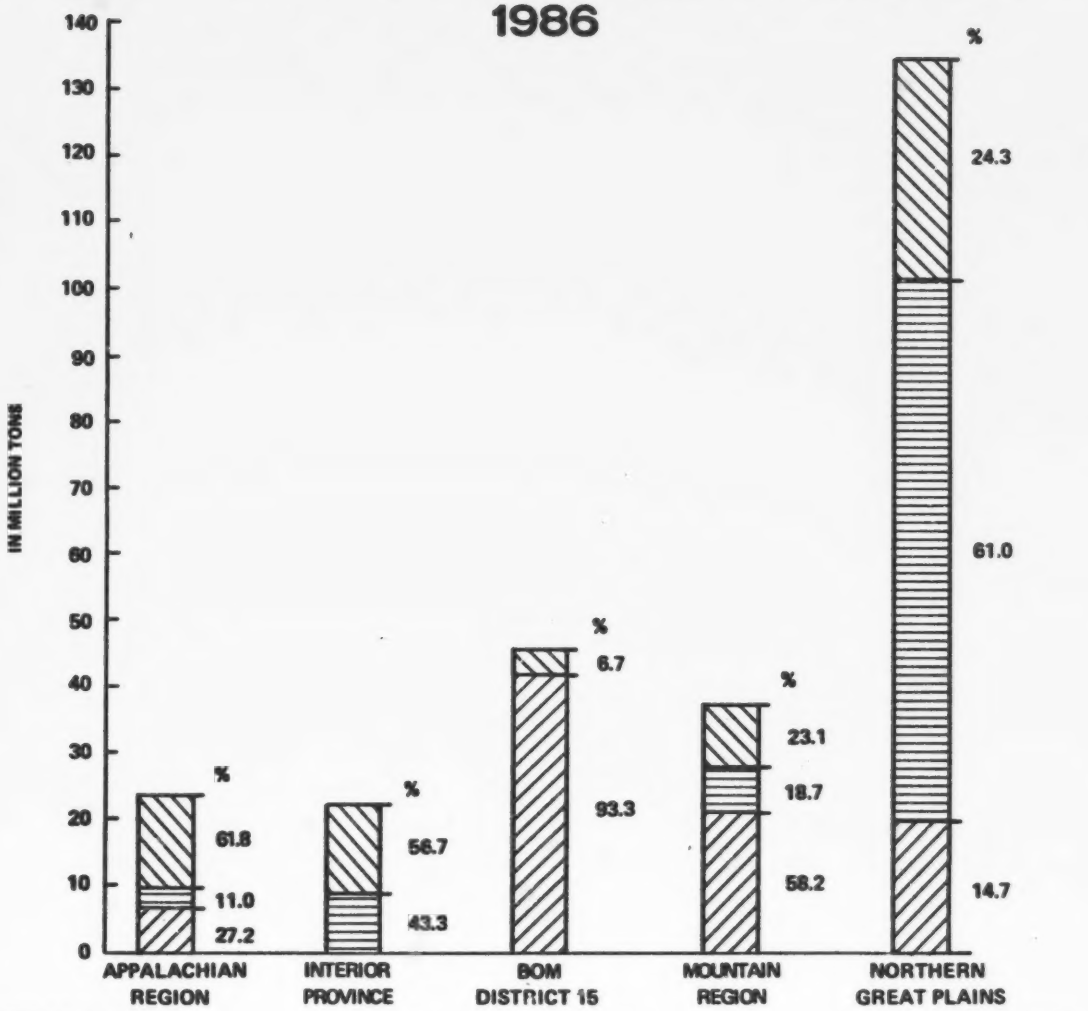
CONCENTRATION RATIOS FOR THE SUPPLIERS OF COAL TO THE NEW UNITS IN 1986

Concentration Ratios	National	Appalachia	Interior Province	Bureau of Mines District 15	Mountain Region	Northern Great Plains
			Including Captives			
4-firm	35.1	40.0	75.9	97.8	69.1	51.8
8-firm	53.1	62.9	97.7	100.0 (5 firms)	94.3	75.8
			Excluding Captives			
4-firm	44.6	45.9	75.9	100.0 (1 non-captive firm)	100.0 (3 non-captive firms)	60.7
8-firm	67.2	66.3	97.7			88.9

Since many of the utilities deal in only one or possibly two of the regional coal supply markets it may be more informative to look at the regional markets. From Table 13 it is clear that all of the regional coal supply markets have appreciably higher concentration ratios than the national ratios, except for Appalachia. From region to region the concentration ratios vary widely from a 4-firm concentration ratio (including captives) of 40.0 percent in Appalachia to a 4-firm ratio of 97.8 percent in Bureau of Mines District 15. The characteristics of the firms in each supply region also vary from region to region. Graph 3 shows the supply of coal by region under contract to new generating units in 1986. It identifies: the total tonnage assured from each supply region; the captive, oil company controlled, or independent supplier proportions of the regional totals; and the number of suppliers in each region who are captive, oil controlled, or independent.

GRAPH 3

SUPPLY OF COAL BY REGION UNDER CONTRACT TO NEW GENERATING UNITS 1986



TYPE OF SUPPLIER	NUMBER OF SUPPLIERS					* NATIONAL TOTAL
INDEPENDENT PRODUCER	13	5	1	1	7	26
OIL INDUSTRY CONTROLLED	3	5	0	2	6	10
CAPTIVE TO THE UTILITY INDUSTRY	4	0	4	7	6	21

*TOTAL 1986 NATIONAL TONNAGE UNDER CONTRACT TO NEW GENERATING UNITS IS 258.9 MILLION TONS. CAPTIVE OPERATIONS WILL SUPPLY 88.8 MILLION TONS (34.3% OF TOTAL) OIL INDUSTRY CONTROLLED COMPANIES 100.0 MILLIONS TONS (38.7%), AND INDEPENDENT PRODUCERS 70.1 MILLION TONS (27.0%).

Appendix 4 and Appendix 5 list the largest suppliers and the tonnages they will supply in the Appalachian Region and Interior Province, respectively.

The three remaining coal supply regions are located west of the Mississippi River. These regions have all been developing into major coal production areas in the last decade. Prior to that the bulk of utility coal production in the U. S. was from the Appalachian Region and the Interior Province. The Western coal areas appear to be developing in different patterns than the older, more developed Eastern coal regions. Compared to the East, much more of the coal in the West will be produced by captive operations or oil industry controlled firms. The major factors influencing the utilities in the West to supply their coal needs from captive operations are: the limited development of the Western coal industry, the relatively small cost (compared to an underground mine) of developing a large strip mining operation (much of the coal in the West can be strip-mined), and the opportunity to build a mine-mouth plant thereby minimizing coal transportation costs and the overall cost of electricity. The movement of the oil industry into the Western coal regions appears to originally have been with the idea of using the coal for future synthetic fuel production; in recent years with the growing prosperity of the coal industry the oil industry has diversified into coal production.

Appendices 6, 7, and 8 list the largest suppliers from Bureau of Mines District 15, the Mountain Region, and the Northern Great Plains, respectively.

Transport of Coal to New Units

Table 14 shows the origin (by Bureau of Mines coal producing districts) of the coal going to new coal-fired units and its destination (by state) in 1981 and 1986, by principal mode of transportation. Table 13 also shows the tonnage with an assured mode of transportation (column 5), the ratio of the tonnage with an assured mode of transportation to the total demand for the new units (column 6), and the ratio of the tonnage with assured transportation to the coal tonnage with a mine supply contract (column 7).

The data from Table 14 is aggregated in Tables 15 and 16 to show, respeccively, how the coal will be transported from the major coal producing regions, and how it will be delivered to the various geographic regions. From the data presented in Tables 14, 15 and 16 it is possible to make the following observations:

a. Contractual agreements for transportation are not always concluded at the same time as coal supply contracts. This is evident from the proportions of incremental coal demand committed to supply and to transportation contracts. In a few instances, a utility will identify an assured mode of transportation without having an assured source of coal. This usually occurs where a plant has established rail service. Generally, however, the transportation contract will come after the supply contract.

b. Following traditional patterns of steam coal movement, nearly two-thirds of the 1986 incremental coal for new units will be moved by rail. However, only 39.5 percent of the 1986 incremental coal projected to move by rail has an established tariff or similar binding agreement. Coal projected to be moved by rail from Appalachia and the Rockies show the lowest levels of assuredness. Utilities expecting to receive coal from Appalachia by rail indicate that the well established network of rail service in Appalachia can easily accomodate the incremental coal traffic. This may be of more concern in the Rockies where facilities to move coal by rail are developed to lesser a degree.

c. The bulk of the barge shipments will originate in Appalachia and go to new units in the East. The 9 million tons of coal identified to come from the Rockies and having barge as its primary mode of transportation will be going to Indiana; the first leg of these shipments will be by rail.

d. Shipments by truck or belt, indicating mine-mouth plant operations, occur almost entirely in the West.

e. The coal slurry pipeline deliveries will originate in Utah, make one stop in Utah and continue into Nevada. The pipeline, which is being built by the Nevada Power Company, will go to Nevada Power's Warner Valley Plant, and then continue on to the Allen Plant.

f. Coal deliveries across the Great Lakes by collier will originate in the Northern Great Plains and go to new units in the East North Central Region, the first leg of the shipments will be by rail.

Table 14

Origin-Destination of Coal For New Units in 1981 and 1986

by Principal Mode of Transport

ORIGIN BY BOP DISTRICT (1)	DESTINATION BY STATE (2)	PROPOSED MODE OF TRANSPORT (3)	1981 TOTAL COAL DEMAND IN 1000 TONS (4)	1981 TONNAGE WITH TRANSPORT CONTRACT AMOUNT IN 1000 TONS (5)	1981 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND TOTAL (6)	1981 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND WITH CONTRACT (7)	1986 TOTAL COAL DEMAND IN 1000 TONS (4)	1986 TONNAGE WITH TRANSPORT CONTRACT AMOUNT IN 1000 TONS (5)	1986 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND TOTAL (6)	1986 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND WITH CONTRACT (7)
UNKNOWN	ALA	UNKNOWN	0	0	0.0	0.0	5200	0	0.0	0.0
	ARIZ	RAILROAD	0	0	0.0	0.0	1920	0	0.0	0.0
	ARK	UNKNOWN	0	0	0.0	0.0	1750	0	0.0	0.0
	COLO	RAILROAD	0	0	0.0	0.0	900	0	0.0	0.0
	FLOR	RAILROAD	600	0	0.0	0.0	4500	0	0.0	0.0
	GA	UNKNOWN	0	0	0.0	0.0	3660	0	0.0	0.0
	ILL	RAILROAD	0	0	0.0	0.0	500	0	0.0	0.0
		BARGE	290	0	0.0	0.0	450	0	0.0	0.0
	TOTAL FOR ILL		290	0	0.0	0.0	950	0	0.0	0.0
	IND	RAILROAD	1500	0	0.0	0.0	2300	0	0.0	0.0
	IOWA	RAILROAD	0	0	0.0	0.0	2000	0	0.0	0.0
	KAN	RAILROAD	0	0	0.0	0.0	815	0	0.0	0.0
	KY	UNKNOWN	0	0	0.0	0.0	2020	0	0.0	0.0
		RAILROAD	1000	0	0.0	0.0	2000	0	0.0	0.0
	TOTAL FOR KY		1000	0	0.0	0.0	4020	0	0.0	0.0
	MD	RAILROAD	0	0	0.0	0.0	1500	0	0.0	0.0
	MICH	UNKNOWN	0	0	0.0	0.0	1200	0	0.0	0.0
		RAILROAD	0	0	0.0	0.0	270	0	0.0	0.0
		COLLIER	0	0	0.0	0.0	250	0	0.0	0.0
	TOTAL FOR MICH		0	0	0.0	0.0	1720	0	0.0	0.0
	MISS	RAILROAD	0	0	0.0	0.0	752	0	0.0	0.0
	MO	UNKNOWN	0	0	0.0	0.0	1250	0	0.0	0.0
	N Y	RAILROAD	0	0	0.0	0.0	6827	0	0.0	0.0
	OKLA	UNKNOWN	0	0	0.0	0.0	4500	0	0.0	0.0
	PA	RAILROAD	0	0	0.0	0.0	1900	0	0.0	0.0
	S C	UNKNOWN	0	0	0.0	0.0	1287	0	0.0	0.0
		RAILROAD	0	0	0.0	0.0	938	938	100.0	0.0
	TOTAL FOR S C		0	0	0.0	0.0	2225	938	42.2	0.0
	WISC	RAILROAD	0	0	0.0	0.0	4400	0	0.0	0.0
TOTAL FROM DISTRICT UNKNOWN			3390	0	0.0	0.0	53809	938	1.8	0.0
1	DEL	RAILROAD	300	0	0.0	0.0	300	0	0.0	0.0
	PA	RAILROAD	0	0	0.0	0.0	1900	0	0.0	0.0
		BELT	1300	1300	100.0	100.0	1300	1300	100.0	100.0
	TOTAL FOR PA		1300	1300	100.0	100.0	3200	1300	40.6	100.0
TOTAL FROM DISTRICT 1			1600	1300	81.3	100.0	3500	1300	37.1	100.0
2	PA	RAILROAD	0	0	0.0	0.0	4500	0	0.0	0.0
TOTAL FROM DISTRICT 2			0	0	0.0	0.0	4500	0	0.0	0.0
3	W VA	RAILROAD	3000	0	0.0	0.0	3000	0	0.0	0.0
TOTAL FROM DISTRICT 3			3000	0	0.0	0.0	3000	0	0.0	0.0
4	OHIO	RAILROAD	0	0	0.0	0.0	1650	0	0.0	0.0
		TRUCK	750	750	100.0	100.0	750	750	100.0	100.0
	TOTAL FOR OHIO		750	750	100.0	100.0	2350	750	31.9	100.0
	PA	BARGE	4700	3000	63.8	100.0	4700	3000	63.8	100.0
TOTAL FROM DISTRICT 4			5450	3750	68.8	100.0	7050	3750	53.2	100.0
8	DEL	RAILROAD	500	0	0.0	0.0	500	0	0.0	0.0
	GA	RAILROAD	1800	1800	100.0	100.0	7420	7200	97.0	100.0
		BARGE	317	317	100.0	100.0	317	317	100.0	100.0
	TOTAL FOR GA		2117	2117	100.0	100.0	7737	7517	97.2	100.0
	ILL	BARGE	350	185	53.0	100.0	0	0	0.0	0.0
	KY	RAILROAD	2660	1460	54.9	100.0	2750	1950	98.4	221.4
		BARGE	1500	1500	100.0	0.0	3000	1900	50.0	0.0
	TOTAL FOR KY		4160	2960	71.2	282.7	5750	3850	53.0	435.7
	MICH	RAILROAD	1785	0	0.0	0.0	1865	0	0.0	0.0
	MISS	RAILROAD	506	506	100.0	100.0	1272	1272	100.0	100.0
	N C	RAILROAD	1410	1410	100.0	100.0	4314	1444	33.5	33.5
	OHIO	BARGE	3550	3550	100.0	134.0	4460	3200	72.7	91.4
	S C	RAILROAD	463	463	100.0	100.0	469	469	100.0	0.0
	W VA	RAILROAD	3500	0	0.0	0.0	3500	0	0.0	0.0
TOTAL FROM DISTRICT 8			18341	11191	61.0	125.0	29807	16952	56.9	98.0

Table 15 (Continued)

ORIGIN BY ROM DISTRICT (1)	DESTINATION BY STATE (2)	PROPOSED MODE OF TRANSPORT (3)	1981 TOTAL COAL DEMAND IN 1000 TONS (4)	1981 TONNAGE WITH TRANSPORT CONTRACT AMOUNT IN 1000 TONS (5)	1981 AS A % OF COAL DEMAND TOTAL (6)	1981 AS A % OF COAL DEMAND WITH CONTRACT (7)	1986 TOTAL COAL DEMAND IN 1000 TONS (4)	1986 TONNAGE WITH TRANSPORT CONTRACT AMOUNT IN 1000 TONS (5)	1986 AS A % OF COAL DEMAND TOTAL (6)	1986 AS A % OF COAL DEMAND WITH CONTRACT (7)
9	KY	RAILROAD	2060	2060	100.0	100.0	2250	2250	100.0	100.0
		BARGE	0	0	0.0	0.0	2438	2438	100.0	100.0
		TRUCK	1900	0	0.0	0.0	1900	0	0.0	0.0
	TOTAL FOR KY		3960	2060	52.0	48.4	6588	4688	71.2	83.2
	MISS	RAILROAD	1464	0	0.0	0.0	1464	0	0.0	0.0
TOTAL FROM DISTRICT 9			5424	2060	38.0	46.0	8052	4648	58.2	66.0
10	GA	BARGE	317	317	100.0	100.0	317	317	100.0	100.0
	ILL	RAILROAD	2740	1340	48.9	100.0	5417	2350	41.8	100.0
		BARGE	0	0	0.0	0.0	620	0	0.0	0.0
		TRUCK	650	150	23.1	100.0	825	325	39.4	100.0
	TOTAL FOR ILL		3390	1490	44.0	100.0	7062	2675	37.9	100.0
	IND	RAILROAD	4042	2692	66.6	100.0	4216	2844	68.0	100.0
	LA	BARGE	0	0	0.0	0.0	194	0	0.0	0.0
	PC	RAILROAD	1400	1400	100.0	100.0	1250	1250	100.0	100.0
		BARGE	2000	2000	100.0	100.0	2000	2000	100.0	100.0
	TOTAL FOR MO		3400	3400	100.0	100.0	3250	3250	100.0	100.0
TOTAL FROM DISTRICT 10			11149	7909	70.8	100.0	19839	9188	68.6	100.0
11	GA	RAILROAD	917	917	100.0	100.0	917	917	100.0	100.0
	IND	RAILROAD	3950	1900	48.1	73.1	5250	3818	57.5	81.2
		BARGE	0	0	0.0	0.0	1630	0	0.0	0.0
	TOTAL FOR IND		3950	1900	48.1	73.1	6880	3818	43.9	81.2
	KY	RAILROAD	390	390	100.0	100.0	300	300	100.0	100.0
TOTAL FROM DISTRICT 11			5297	3297	61.9	82.1	8097	4235	52.3	95.8
13	ALA	RAILROAD	2000	0	0.0	0.0	4000	0	0.0	0.0
		BARGE	452	0	0.0	0.0	460	0	0.0	0.0
	TOTAL FOR ALA		2452	0	0.0	0.0	4460	0	0.0	0.0
	FLOR	RAILROAD	864	0	0.0	0.0	2964	0	0.0	0.0
	GA	RAILROAD	0	0	0.0	0.0	200	0	0.0	0.0
TOTAL FROM DISTRICT 13			3316	0	0.0	0.0	7664	0	0.0	0.0
15	MO	TRUCK	1500	0	0.0	0.0	1500	0	0.0	0.0
	TEX	UNKNOWN	0	0	0.0	0.0	6345	0	0.0	0.0
		RAILROAD	3915	3915	100.0	100.0	3915	3915	100.0	100.0
		TRUCK	25850	25850	100.0	100.0	37800	35000	92.6	92.6
		BELT	0	0	0.0	0.0	3000	3000	100.0	100.0
	TOTAL FOR TEX		29765	29765	100.0	100.0	51800	41915	82.1	93.7
TOTAL FROM DISTRICT 15			31265	29765	95.2	100.0	52540	41915	79.7	93.7
16	COLC	UNKNOWN	0	0	0.0	0.0	2400	0	0.0	0.0
		TRUCK	2400	2400	100.0	100.0	2400	2400	100.0	100.0
	TOTAL FOR COLO		2400	2400	100.0	100.0	4800	2400	50.0	100.0
TOTAL FROM DISTRICT 16			2400	2400	100.0	100.0	4800	2400	50.0	100.0
17	COLO	RAILROAD	899	899	100.0	100.0	1798	1798	100.0	100.0
	TEX	RAILROAD	1500	0	0.0	0.0	1500	0	0.0	0.0
TOTAL FROM DISTRICT 17			2399	899	37.5	37.5	3298	1798	54.5	54.5
18	ARIZ	RAILROAD	4865	3615	74.3	74.3	5615	3615	64.4	64.4
	N M	RAILROAD	0	0	0.0	0.0	2200	0	0.0	0.0
		TRUCK	3917	3917	100.0	100.0	4034	4034	100.0	100.0
	TOTAL FOR N M		3917	3917	100.0	100.0	6234	4034	64.7	100.0
TOTAL FROM DISTRICT 18			8782	7532	85.8	85.8	11848	7648	64.6	79.3

Table 14 (Continued)

ORIGIN BY BOM DISTRICT (1)	DESTINATION BY STATE (2)	PROPOSED MODE OF TRANSPORT (3)	1981 TOTAL COAL DEMAND IN 1000 TONS (4)	1981 TONNAGE WITH TRANSPORT CONTRACT AMOUNT IN 1000 TONS (5)	1981 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND TOTAL (6)	1981 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND WITH CONTRACT (7)	1984 TOTAL COAL DEMAND IN 1000 TONS (4)	1984 TONNAGE WITH TRANSPORT CONTRACT AMOUNT IN 1000 TONS (5)	1984 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND TOTAL (6)	1984 TONNAGE WITH TRANSPORT CONTRACT AS A % OF COAL DEMAND WITH CONTRACT (7)
19	ARK	RAILROAD	4468	1468	37.2	37.2	12960	1760	13.6	13.6
	COLO	RAILROAD	1729	1729	100.0	100.0	5189	1725	33.3	100.0
	IOWA	RAILROAD	7296	5121	70.2	95.9	7296	5121	70.2	95.9
	KAN	RAILROAD	7283	6683	91.8	100.0	11698	10250	87.7	100.0
	LA	RAILROAD	0	0	0.0	0.0	9417	1750	18.6	45.8
	MINN	RAILROAD	0	0	0.0	0.0	3100	0	0.0	0.0
	MISS	RAILROAD	0	0	0.0	0.0	2800	0	0.0	0.0
	MO	RAILROAD	2000	0	0.0	0.0	2000	0	0.0	0.0
	NEB	RAILROAD	6369	4000	62.8	66.5	6673	4000	59.9	63.3
	OKLA	RAILROAD	11946	10046	84.1	100.0	15401	9001	58.4	100.0
	ORE	RAILROAD	1200	0	0.0	0.0	1200	0	0.0	0.0
	TEX	RAILROAD	9266	7266	78.4	78.4	14338	9860	68.8	83.1
	MISC	RAILROAD	2500	1500	60.0	60.0	6000	3000	50.0	66.8
	WYO	RAILROAD	4912	4912	100.0	100.0	7368	7368	100.0	100.0
		TRUCK	1600	1600	100.0	100.0	1600	1600	100.0	100.0
		BELT	1660	1660	100.0	100.0	1660	1660	100.0	100.0
	TOTAL FOR WYO		8172	8172	100.0	100.0	10628	10628	100.0	100.0
TOTAL FROM DISTRICT 19			62221	46177	74.2	80.4	108692	57099	52.5	71.7
20	ARIZ	RAILROAD	950	0	0.0	0.0	0	0	0.0	0.0
	CA	RAILROAD	0	0	0.0	0.0	4200	0	0.0	0.0
	IND	SAME	4500	4500	100.0	100.0	9000	9000	100.0	100.0
	NEV	RAILROAD	700	0	0.0	0.0	1400	0	0.0	0.0
		PIPELINE	0	0	0.0	0.0	577C	577C	100.0	100.0
	TOTAL FOR NEV		700	0	0.0	0.0	7170	5770	80.5	100.0
	UTAH	RAILROAD	0	0	0.0	0.0	22C0	0	0.0	0.0
		TRUCK	1600	1600	100.0	100.0	3200	160C	5C.C	100.0
		PIPELINE	0	0	0.0	0.0	2916	2916	100.0	100.0
		BELT	800	800	100.0	100.0	800	800	100.0	100.0
	TOTAL FOR UTAH		2400	2400	100.0	100.0	9116	5316	58.3	100.0
TOTAL FROM DISTRICT 20			8350	6900	80.7	87.9	29486	20086	68.1	90.5
21	N D	TRUCK	11200	11200	100.0	100.0	137CC	137CC	100.0	100.0
		BELT	2200	2200	100.0	100.0	44CC	44CC	1CC.C	100.0
	TOTAL FOR N D		13400	13400	100.0	100.0	18100	18100	100.0	100.0
TOTAL FROM DISTRICT 21			13400	13400	100.0	100.0	18100	18100	100.0	100.0
22	IOWA	RAILROAD	0	0	0.0	0.0	450	0	C.C	0.0
	LA	RAILROAD	4000	4000	100.0	100.0	6000	6000	100.0	100.0
	MICH	RAILROAD	999	999	100.0	100.0	999	999	100.0	100.0
		COLLIER	0	0	0.0	0.0	4000	4000	1CC.0	100.0
	TOTAL FOR MICH		999	999	100.0	100.0	4999	4999	100.0	100.0
	MINN	RAILROAD	6900	4400	63.8	100.0	129C0	4400	34.1	100.0
	MONT	BELT	2933	0	0.0	0.0	5665	0	0.0	0.C
	TEX	RAILROAD	9120	0	0.0	0.0	14670	0	0.0	0.0
	MISC	RAILROAD	1700	1700	100.0	100.0	1700	17CC	100.0	100.0
TOTAL FROM DISTRICT 22			25652	11099	43.4	48.1	46384	17099	36.9	45.7
UNITED STATES TOTALS			211496	147579	69.8	83.9	414887	207117	49.9	79.2

Table 15

ORIGIN OF COAL FOR NEW UNITS WITH ASSURED MODE OF TRANSPORT, BY COAL PRODUCING REGION, 1981 AND 1986
(1000 TONS)

1981

Source (Coal Producing Region)	Railroad	Barge	Truck	Collier	Pipeline	Belt	Unknown	Total	% Assured
Appalachia Total*	18,788	10,869	750	0	0	1,300	0	31,707	
(Assured)**	(5,639)	(8,552)	(750)	(0)	(0)	(1,300)	(0)	(16,241)	51.2
Interior Basin	16,963	2,317	2,550	0	0	0	0	21,830	
	(10,699)	(2,317)	(150)	(0)	(0)	(0)	(0)	(13,166)	60.3
Bureau of Mines Dist. 15	3,915	0	27,350	0	0	0	0	31,265	
	(3,915)	(0)	(25,850)	(0)	(0)	(0)	(0)	(29,765)	95.2
Northern Great Plains	81,680	0	12,800	0	0	6,693	0	101,173	
	(54,016)	(0)	(12,800)	(0)	(0)	(3,860)	(0)	(70,676)	69.9
Rockies	8,914	4,500	7,917	0	0	800	0	22,131	
	(4,514)	(4,500)	(7,917)	(0)	(0)	(800)	(0)	(17,731)	80.1
Unknown	3,100	290	0	0	0	0	0	3,390	
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.0
U. S. TOTALS	133,360	17,976	51,367	0	0	8,793	0	211,496	
	(78,783)	(15,369)	(47,467)	(0)	(0)	(5,960)	(0)	(147,579)	69.8
Percent Assured by Mode	59.1	85.5	92.4	0.0	0.0	67.8	0.0	69.8	

1986

	Railroad	Barge	Truck	Collier	Pipeline	Belt	Unknown	Total	% Assured
Appalachia Total*	40,454	13,017	750	0	0	1,300	0	55,521	
(Assured)**	(11,935)	(8,017)	(750)	(0)	(0)	(1,300)	(0)	(22,002)	39.6
Interior Basin	21,264	7,199	2,725	0	0	0	0	31,188	
	(12,951)	(4,755)	(325)	(0)	(0)	(0)	(0)	(18,031)	57.8
Bureau of Mines Dist. 15	3,915	0	39,300	0	0	3,000	6,345	52,560	
	(3,915)	(0)	(35,000)	(0)	(0)	(3,000)	(0)	(41,915)	79.7
Northern Great Plains	142,151	0	15,300	4,000	0	11,725	0	173,176	
	(66,938)	(0)	(15,300)	(4,000)	(0)	(6,060)	(0)	(92,298)	53.3
Rockies	18,913	9,000	9,634	0	8,686	800	2,400	49,433	
	(5,413)	(9,000)	(8,034)	(0)	(8,686)	(800)	(0)	(31,933)	64.6
Unknown	31,502	450	0	250	0	0	20,807	53,009	
	(938)	(0)	(0)	(0)	(0)	(0)	(0)	(938)	1.8
U. S. TOTALS	258,199	29,666	67,709	4,250	8,686	16,825	29,552	414,887	
	(102,090)	(21,772)	(59,409)	(4,000)	(8,686)	(11,160)	(0)	(207,117)	49.9
Percent Assured by Mode	39.5	73.4	87.7	94.1	100.0	66.3	0.0	49.9	

* Total quantities of coal projected to be moved by the specified mode of transport.
** Quantities of coal for which a means of transportation has been assured by a tariff or other contractual agreement (as of October 1977).

Table 16

DESTINATION OF COAL FOR NEW UNITS
WITH ASSURED MODE OF TRANSPORT,
BY MAJOR GEOGRAPHIC REGION, 1981 AND 1986

1981

Destination Eastern Regions	Railroad	Barge	Truck	Collier	Pipeline	Belt	Unknown	Total	% Assured
New England	0	0	0	0	0	0	0	0	
Middle Atlantic Total*	0	4,700	0	0	0	1,300	0	6,000	
(Assured)**	(0)	(3,000)	(0)	(0)	(0)	(1,300)	(0)	(4,300)	71.7
East North Central	19,216	8,690	1,400	0	0	0	0	29,306	
	(10,131)	(8,235)	(900)	(0)	(0)	(0)	(0)	(19,266)	65.7
South Atlantic	13,354	634	0	0	0	0	0	13,988	
	(4,590)	(634)	(0)	(0)	(0)	(0)	(0)	(5,224)	37.3
East South Central	10,080	1,952	1,900	0	0	0	0	13,932	
	(4,416)	(1,500)	(0)	(0)	(0)	(0)	(0)	(5,916)	42.5
Sub-Total	42,650	15,976	3,300	0	0	1,300	0	63,226	
	(19,137)	(13,369)	(900)	(0)	(0)	(1,300)	(0)	(34,706)	54.9
Western Regions									
West North Central	31,248	2,000	12,700	0	0	2,200	0	48,148	
	(21,604)	(2,000)	(11,200)	(0)	(0)	(2,200)	(0)	(37,004)	76.9
West South Central	44,207	0	25,850	0	0	0	0	70,057	
	(26,887)	(0)	(25,850)	(0)	(0)	(0)	(0)	(52,737)	75.3
Mountain	14,055	0	9,517	0	0	5,293	0	28,865	
	(11,155)	(0)	(9,517)	(0)	(0)	(2,460)	(0)	(23,132)	80.1
Pacific	1,200	0	0	0	0	0	0	1,200	
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.0
Sub-Total	90,710	2,000	51,067	0	0	7,493	0	148,270	
	(59,646)	(2,000)	(49,567)	(0)	(0)	(4,660)	(0)	(112,873)	76.1
U. S. Totals	133,360	17,976	51,367	0	0	8,793	0	211,496	
	(78,783)	(15,369)	(47,467)	(0)	(0)	(5,960)	(0)	(147,579)	69.8
Percent Assured By Mode	59.1	85.5	92.4	0.0	0.0	67.8	0.0	69.8	

1986

Eastern Regions									
New England	0	0	0	0	0	0	0	0	
Middle Atlantic	15,127	4,700	0	0	0	1,300	0	21,127	
	(0)	(3,000)	(0)	(0)	(0)	(1,300)	(0)	(4,300)	20.4
East North Central	34,717	16,100	1,575	4,250	0	0	1,200	57,842	
	(13,933)	(12,200)	(1,075)	(4,000)	0	0	(0)	(31,208)	54.0
South Atlantic	30,422	634	0	0	0	0	4,887	35,943	
	(10,968)	(634)	0	0	0	0	(0)	(11,602)	32.3
East South Central	17,568	6,038	1,900	0	0	0	7,220	32,726	
	(5,372)	(3,938)	(0)	(0)	(0)	(0)	(0)	(9,310)	28.4
Sub-Total	97,834	27,472	3,475	4,250	0	1,300	13,307	147,638	
	(30,273)	(19,772)	(1,075)	(4,000)	0	(1,300)	(0)	(56,420)	38.2
Western Regions									
West North Central	48,174	2,000	15,200	0	0	4,400	1,250	71,024	
	(25,021)	(2,000)	(13,700)	0	0	(4,400)	(0)	(45,121)	63.5
West South Central	78,201	194	37,800	0	0	3,000	12,595	131,790	
	(32,286)	(0)	(35,000)	0	0	(3,000)	(0)	(70,286)	53.3
Mountain	28,590	0	11,234	0	8,686	8,125	2,400	59,035	
	(14,510)	0	(9,634)	0	(8,686)	2,460)	(0)	(35,290)	59.8
Pacific	5,400	0	0	0	0	0	0	5,400	
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.0
Sub-Total	160,365	2,194	64,234	0	8,686	15,525	16,245	267,249	
	(71,817)	(2,000)	(58,334)	0	(8,686)	(9,860)	(0)	(150,697)	56.4
U. S. Totals	258,199	29,666	67,709	4,250	8,686	16,825	29,552	414,887	
	(102,090)	(21,772)	(59,409)	(4,000)	(8,686)	(11,160)	(0)	(207,117)	49.9
Percent Assured by Mode	(39.5)	(73.4)	(87.7)	(94.1)	(100.0)	(66.3)	(0.0)	(49.9)	

* Total quantities of coal projected to be moved by the specified modes of transport.
** Quantities of coal for which a means of transportation has been assured by a tariff or other contractual agreement (as of October 1977).

Strategies For Complying With Sulfur Emission Regulations, 1977-1981

Of the 66,210 MW of new coal-fired generating capacity planned for operation during the 5 year period 1977-1981, 56.3 percent or 37,200 MW, expect to meet 1981 sulfur regulations by using low-sulfur (i.e. "compliance") coal. The bulk of the remaining new capacity, 28,601 MW, plan to control SO_x emission by employing some type of flue gas desulfurization (FGD) system. The compliance strategy for the 330 MW Wyodak unit #1 of the Pacific Power and Light Company, scheduled for operation in 1978, was still unknown as of November 1977. As can be seen from Table 17, except for the disparity in compliance strategies for units due on in 1980, the new coal capacity divides about evenly between units which plan to use low-sulfur coal and units planning to employ FGD. Of the 19,100 MW of new coal capacity planned in 1980 almost two-thirds, or 12,544 MW, expect to use low-sulfur coal to meet 1981 sulfur regulations. Most of this capacity, about 9,000 MW, will be sited in states west of the Mississippi River and use low-sulfur western coal.

The majority of the new coal units scheduled for operation during the period 1977-1981 in states east of the Mississippi River propose to use low-sulfur coal to comply with sulfur regulations. As shown in Table 17, nearly two-thirds of the new coal capacity in the East, 17,119 MW, anticipate meeting 1981 sulfur regulations with low-sulfur coal. The remaining 9,976 MW of the new Eastern coal capacity will employ FGD to meet sulfur oxide emission standards. Based on utility reports, all the new Eastern units planning FGD systems and most of the Eastern capacity planning to meet sulfur standards with low-sulfur coal expect to use coal produced from mines east of the Mississippi. Only 2,997 MW of capacity, all in Michigan, Wisconsin and Indiana, plan to use low-sulfur coal from Montana, Wyoming, and Utah.

In regions west of the Mississippi River, the new coal capacity is divided nearly equally between those planning to use low-sulfur coal and FGD systems to comply with sulfur regulations. Of the 39,115 MW of new Western coal capacity scheduled during the period, almost 51 percent, or 20,160 MW, propose meeting 1981 sulfur regulations with low-sulfur coal. Practically all of the remaining capacity, 18,625 MW, will require FGD to meet sulfur oxide eimision standards. Except for two new units in Missouri, which plan to use Illinois coal, all the coal capacity in the West will burn coal produced in Western mines.

Table 17

STRATEGY FOR COMPLYING WITH 1981 SULFUR
EMISSION STANDARDS FOR NEW COAL UNITS SCHEDULED FOR INITIAL OPERATION
BETWEEN 1977 AND 1981

Year	Number of Units	Total Capacity (MW)	STRATEGY: Low-Sulfur Coal No. of Units	Low-Sulfur Coal Capacity (MW)	Flue Gas Desulfurization No. of Units	Flue Gas Desulfurization Capacity (MW)	Unknown No. of Units	Unknown Capacity (MW)
1977	21	10,697	14	6,593*	7	4,104	0	0
1978	31	13,416	14	7,112	16	5,974	1	330
1979	25	11,092	12	5,911	13	5,181	0	0
1980	35	19,100	22	12,544	13	6,556	0	0
1981	22	11,905	10	5,119	12	6,787	0	0
TOTAL	134	66,210	72	37,279	61	28,601	1	330
Percent		(100)		(56.3)		(43.2)		(0.5)

* Includes 650 MW of capacity planning to use washed coal.

Source: FPC Form 67, Steam-Electric Plant Air and Water Quality Control Data; Part IV, Steam-Electric Plant Air Quality Control Data: Plans and Costs for Meeting Air Pollution Standards.

Table 18

REGIONAL STRATEGIES FOR COMPLYING WITH 1981 SO_x EMISSION STANDARDS FOR NEW COAL UNITS SCHEDULED FOR INITIAL OPERATION BETWEEN 1977 AND 1981

			STRATEGY					
			Low-Sulfur Coal		Flue Gas Desulfurization		Unknown	
Eastern Regions	Total No. of Units	Total Capacity (MW)	No. of Units	Capacity (MW)	No. of Units	Capacity (MW)	No. of Units	Capacity (MW)
New England	0	0	0	0	0	0	0	0
Mid-Atlantic	3	2,284	1	650*	2	1,634	0	0
East North Central	24	11,571	15	7,901	9	3,670	0	0
South Atlantic	10	6,218	6	4,326	4	1,892	0	0
East South Central	17	7,022	8	4,242	9	2,780	0	0
Sub-Total	54	27,095	30	17,119	24	9,976	0	0
Percent		(100)		(63.2)		(36.8)		
Western Regions								
West North Central	26	13,074	15	6,856	11	6,218	0	0
West South Central	31	17,154	23	11,854	8	5,300	0	0
Mountain	22	8,387	3	950	18	7,107	1	330
Pacific	1	500	1	500	0	0	0	0
Sub-Total	80	39,115	42	20,160	37	18,625	1	330
Percent		(100)		(50.6)		(47.6)		(0.8)
U. S. TOTAL	134	66,210	72	37,279	61	28,601	1	330
Percent		(100)		(56.3)		(43.2)		(0.5)

* Washed Coal

Table 19 assesses the electric utilities' use of flue gas desulfurization technology as a strategy to comply with sulfur dioxide emission regulations. Sixty-one coal-fired units with a capacity of 28,601 MW will be equipped with FGD systems. Of the 61 units 37 will be located in the Western Regions, while 24 units will be in the Eastern Regions.

The reasons for the large number of new Western coal-fired units requiring FGD to comply with 1981 sulfur regulations are two-fold. First, much of the lignite and sub-bituminous coal reserves located west of the Mississippi River, although low in sulfur content, are also low in energy content (ranging between 6,300-10,500 Btu's per pound) and, consequently, exceed sulfur dioxide emission standards expressed in pounds of sulfur dioxide per million Btu of gross heat input (the terms in which most Western States specify their sulfur regulations). Secondly, a substantial portion of the new Western coal capacity is governed by sulfur regulations which are more stringent than the Federal New Source Performance Standards (NSPS) 14/ of 1.2 pounds of sulfur dioxide per million Btu. As shown in Table 19, nearly one-third of the new Western coa capacity requiring FGD for compliance with 1981 sulfur limits is governed by sulfur regulations more stringent than Federal NSPS. Similarly, in the East about 20 percent of the new coal capacity requiring FGD is governed by sulfur regulations more stringent than Federal NSPS.

Appendix 9 lists the new coal-fired units projected to begin operations in the 1977-1981 period and identifies for each unit: the average Btu and sulfur characteristics of the coal; the estimated SO_2 emissions based on the quality characteristics of the coal; the 1981 SO_2 emission regulations; and the strategy for compliance with the standards.

14/ Federal New Source Performance Standards apply to all fossil-fuel fired steam generating units constructed or modified after August 17, 1971 with a heat input rate greater than 250 million Btu's per hour.

Table 19

COAL CAPACITY SCHEDULED FOR INITIAL OPERATION
BETWEEN 1977 AND 1981
REQUIRING FGD TO COMPLY WITH 1981 SULFUR REGULATIONS

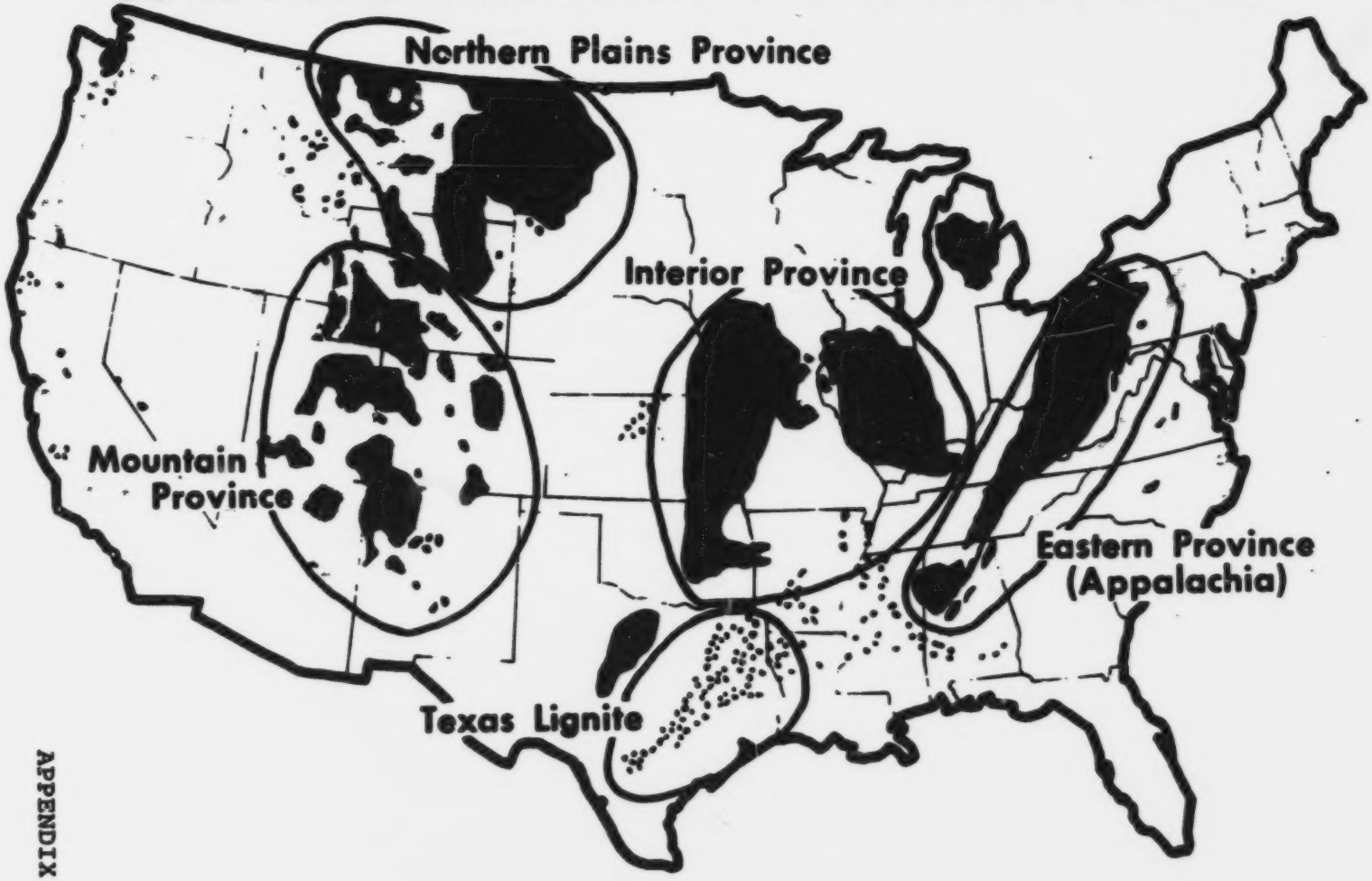
			Portion Governed by Sulfur Regulations More Stringent Than Federal NSPS		Portion Governed by Sulfur Regulations Equal To Or Less Stringent Than Federal NSPS	
Eastern Regions	No. of Units	Total FGD Capacity (MW)	No. of Units	Capacity (MW)	No. of Units	Capacity (MW)
New England	0	0	0	0	0	0
Mid-Atlantic	2	1,634	2	1,634	0	0
East North Central	9	3,670	1	375	8	3,295
South Atlantic	4	1,892	0	0	4	1,892
East South Central	9	2,780	0	0	9	2,780
Sub-Total	24	9,976	3	2,009	21	7,967
Percent		(100.0)		(20.0)		(80.0)
Western Regions						
West North Central	11	6,218	2	1,580	9	4,638
West South Central	8	5,300	0	0	8	5,300
Mountain	18	7,107	12	4,432	6	2,675
Pacific	0	0	0	0	0	0
Sub-Total	37	18,625	14	6,012	23	12,613
Percent		(100.0)		(32.3)		(67.7)
U. S. TOTAL	61	28,601	17	8,021	44	20,580
Percent		(100.0)		(28.0)		(72.0)

APPENDICES

GEOGRAPHIC DIVISIONS

APPENDIX 1

COAL-PRODUCING AREAS IN THE UNITED STATES



APPENDIX 2

DEFINITION OF BITUMINOUS COAL AND LIGNITE PRODUCING DISTRICTS

DISTRICT 1.—EASTERN PENNSYLVANIA

Pennsylvania

Armstrong County (part).—All mines east of the Allegheny River, and those mines served by the Pittsburgh & Shawmut Railroad located on the west bank of the river.

Fayette County (part).—All mines located on and east of the line of Indian Creek Valley branch of the Baltimore & Ohio Railroad.

Indiana County (part).—All mines not served by the Saltsburg branch of the Pennsylvania Railroad.

Westmoreland County (part).—All mines served by the Pennsylvania Railroad from Torrance, east.

All mines in the following counties:

Bedford	Centre	Forest	McKean
Blair	Clarion	Fulton	Mifflin
Bradford	Clearfield	Huntingdon	Potter
Cambria	Clinton	Jefferson	Somerset
Cameron	Elk	Lycoming	Tioga

Maryland.—All mines in the State.

West Virginia.—All mines in the following counties:

Grant	Mineral	Tucker

DISTRICT 2.—WESTERN PENNSYLVANIA

Pennsylvania

Armstrong County (part).—All mines west of the Allegheny River except those mines served by the Pittsburgh & Shawmut Railroad.

Fayette County (part).—All mines except those on and east of the line of Indian Creek Valley branch of the Baltimore & Ohio Railroad.

Indiana County (part).—All mines served by the Saltsburg branch of the Pennsylvania Railroad.

Westmoreland County (part).—All mines except those served by the Pennsylvania Railroad from Torrance, east.

All mines in the following counties:

Allegheny	Butler	Lawrence	Venango
Beaver	Greene	Mercer	Washington

DISTRICT 3.—NORTHERN WEST VIRGINIA

West Virginia

Nicholas County (part).—All mines served by or north of the Baltimore & Ohio Railroad.

All mines in the following counties:

Barbour	Jackson	Randolph	Webster
Braxton	Lewis	Ritchie	Wetzel
Calhoun	Marion	Roane	Wirt
Doddridge	Monongalia	Taylor	Wood
Gilmer	Pleasants	Tyler	
Harrison	Preston	Upshur	

DISTRICT 4.—OHIO.—All mines in the State.

DISTRICT 5.—MICHIGAN.—All mines in the State.

DISTRICT 6.—PANHANDLE

West Virginia.—All mines in the following counties:

Brooke	Hancock	Marshall	Ohio

DISTRICT 7.—SOUTHERN NO. 1

West Virginia

Fayette County (part).—All mines east of Gauley River and all mines served by the Gauley River branch of the Chesapeake & Ohio Railroad and mines served by the Virginian Railway.

McDowell County (part).—All mines in that portion of the county served by the Dry Fork branch of the Norfolk & Western Railroad and east thereof.

Raleigh County (part).—All mines except those on the Coal River branch of the Chesapeake & Ohio Railroad and north thereof.

Wyoming County (part).—All mines in that portion served by the Gilbert branch of the Virginian Railway lying east of the south of Slab Fork of Guyandot River and in that portion served by the main line and the Glen Rogers branch of the Virginian Railway.

All mines in the following counties:

Greenbrier	Mercer	Monroe	Pocahontas	Summers

Virginia

Buchanan County (part).—All mines in that portion of the county served by the Richlands-Jewell Ridge branch of the Norfolk & Western Railroad and in that portion on the headwaters of Dismal Creek east of Lynn Camp Creek (a tributary of Dismal Creek).

Tazewell County (part).—All mines in those portions of the county served by the Dry Fork branch to Cedar Bluff and from Hurricane Junction to Bluefield branch of the Norfolk & Western Railroad and Richlands-Jewell Ridge branch of the Norfolk & Western Railroad.

All mines in the following counties:

Montgomery	Pulaski	Wythe	Giles	Craig

DISTRICT 8.—SOUTHERN NO. 2

West Virginia

Fayette County (part).—All mines west of the Gauley River except mines served by the Gauley River branch of the Chesapeake & Ohio Railroad.

McDowell County (part).—All mines west of and not served by the Dry Fork branch of the Norfolk & Western Railroad.

Nicholas County (part).—All mines in that part of the county south of and not served by the Baltimore & Ohio Railroad.

Raleigh County (part).—All mines on the Coal River branch of the Chesapeake & Ohio Railroad and north thereof.

DISTRICT 8.—SOUTHERN NO. 2—Continued

West Virginia—Continued

Wyoming County (part).—All mines in that portion served by the Gilbert branch of the Virginian Railway and lying west of the south of Slab Fork of Guyandot River.

All mines in the following counties:

Boone	Kanawha	Mason	Wayne
Cabell	Lincoln	Mingo	
Clay	Logan	Putnam	

Virginia

Buchanan County (part).—All mines in the county, except in that portion on the headwaters of Dismal Creek, east of Lynn Camp Creek (a tributary of Dismal Creek) and in that portion served by the Richlands-Jewell Ridge branch of the Norfolk & Western Railroad.

Tazewell County (part).—All mines in the county except in those portions served by the Dry Fork branch of the Norfolk & Western Railroad and branch from Hurricane Junction to Bluefield of Norfolk & Western Railroad and Richlands-Jewell Ridge branch of the Norfolk & Western Railroad.

All mines in the following counties:

Dickenson	Lee	Russell	Scott	Wise

Kentucky.—All mines in the the following counties in eastern Kentucky:

Bell	Greenup	Lawrence	Morgan
Boyd	Harlan	Lee	Owsley
Breathitt	Jackson	Leslie	Perry
Carter	Johnson	Letcher	Pike
Clay	Knott	McCreary	Whitley
Elliott	Knox	Magoffin	Wolfe
Floyd	Laurel	Martin	

Tennessee.—All mines in the following counties:

Anderson	Cumberland	Overton	
Campbell	Fentress	Scott	
Claiborne	Morgan	Unicoi	

North Carolina.—All mines in the State.

DISTRICT 9.—WEST KENTUCKY

Kentucky.—All mines in the following counties in western Kentucky:

Butler	Hancock	McLean	Todd
Christian	Henderson	Muhlenberg	Union
Crittenden	Hopkins	Ohio	Warren
Daviess	Logan	Simpson	Webster

DISTRICT 10.—ILLINOIS.—All mines in the State.

DISTRICT 11.—INDIANA.—All mines in the State.

DISTRICT 12.—IOWA.—All mines in the State.

DISTRICT 13.—SOUTHEASTERN

Alabama.—All mines in the State.

Georgia.—All mines in the following counties:

Dade	Walker	

Tennessee.—All mines in the following counties:

Bledsoe	Marion	Sequatchie	Warren	
Grundy	McMinn	Van Buren	White	
Hamilton	Rhea			

DISTRICT 14.—ARKANSAS-OKLAHOMA

Arkansas.—All mines in the State.

Oklahoma.—All mines in the following counties:

Haskell	Le Flore	Sequoyah

DISTRICT 15.—SOUTHWESTERN

Kansas.—All mines in the State.

Texas.—All mines in the State.

Missouri.—All mines in the State.

Oklahoma.—All mines in the following counties:

Coal	Latimer	Okmulgee	Rogers	Wagoner
Craig	Muskogee	Pittsburg	Tulsa	

DISTRICT 16.—NORTHERN COLORADO

All mines in the following counties in the State:

Adams	Douglas	Jackson	Larimer
Arapahoe	Elbert	Jefferson	Weld
Boulder	El Paso		

DISTRICT 17.—SOUTHERN COLORADO

Colorado.—All mines except those included in District 16.

New Mexico.—All mines except those included in District 18.

DISTRICT 18.—NEW MEXICO

New Mexico.—All mines in the following counties:

Grant	McKinley	Sandoval	San Miguel	Socorro
Lincoln	Rio Arriba	San Juan	Santa Fe	

Arizona.—All mines in the State.

California.—All mines in the State.

DISTRICT 19.—WYOMING

Wyoming.—All mines in the State.

Idaho.—All mines in the State.

DISTRICT 20.—UTAH.—All mines in the State.

DISTRICT 21.—NORTH DAKOTA-SOUTH DAKOTA.—All mines in North Dakota and South Dakota.

DISTRICT 22.—MONTANA.—All mines in the State.

DISTRICT 23.—WASHINGTON

Washington.—All mines in the State.

Oregon.—All mines in the State.

Alaska.—All mines in the Territory.

APPENDIX 3

Table A4-1

SUPPLIERS OF COAL FROM THE APPALACHIAN REGION TO NEW COAL-FIRED UNITS SCHEDULED FOR OPERATION FROM 1977-1986

		Quantity in 10^3 Tons	Percent of Total
1.	Pennsylvania Power Co. (captive)	3,000	13.1
2.	Harbet Buckhorn	2,150	9.4
3.	Harland Land Co.	2,037	8.9
4.	A. T. Massey	1,979	8.6
5.	Carolina Power & Light (captive)	1,600	7.0
6.	Donaldson Mining Co.	1,500	6.5
7.	South Mississippi EPA (captive)	1,272	5.5
8.	Island Creek Coal Co.*	905	3.9
9.	Eastern Coal Co.	905	3.9
10.	Consolidation Coal Co.*	857	3.8
	Sub-Total	16,205	70.6
	Other	6,748	29.4
	Total Assured (1986)	22,953**	

* Operations owned or controlled by oil companies. Oil companies will account for 2,514 thousand tons of the total 22,953 thousand tons presently assured by contract for 1986 from this region.

** Includes 6,247 thousand tons of captive coal.

APPENDIX 4

Table A5-1

SUPPLIERS OF COAL FROM THE INTERIOR PROVINCE TO NEW COAL-FIRED UNITS SCHEDULED FOR OPERATION FROM 1977-1986

		Quantity in 10^3 Tons	Percent of Total
1.	Peabody Coal Co.	7,806	36.9
2.	Old Ben Coal Co.*	3,675	17.4
3.	Exxon*	2,866	13.6
4.	Amax*	1,700	8.0
5.	General Exploration Co.	1,464	6.9
6.	Freeman United Co.	1,450	6.9
7.	Mapco	950	4.5
8.	Consolidation Coal Co.*	750	3.5
9.	Williamson Coal Co.	325	1.5
10.	Arch Minerals*	159	0.8
	Total Assured (1986)	21,145	100.0

* Operations owned or controlled by oil companies.

Table A6-1

SUPPLIERS OF COAL FROM BUREAU OF MINES DISTRICT #15 TO NEW COAL-FIRED UNITS SCHEDULED FOR OPERATION FROM 1977-1986

	Quantity in 10^3 Tons	Percent of Total
1. Texas Utilities (captive)	30,120	67.4
2. Brazos (captive)	6,000	13.4
3. Alcoa Aluminum 1/	3,000	6.7
4. Southwestern Electric Power (captive)	2,800	6.3
5. Texas Municipal Power Agency (captive)	2,795	6.2
Total Assured (1986)	44,715	100.0

1/ Alcoa Aluminum owns the coal being mined by Texas Utilities for the Sandow Plant which generates power for Alcoa.

Table A7-1

SUPPLIERS OF COAL FROM THE MOUNTAIN REGION TO NEW COAL-FIRED UNITS SCHEDULED FOR OPERATION FROM 1977-1986

		Quantity in 10^3 Tons	Percent of Total
1.	Indiana-Michigan Electric Co. (captive)	9,000	24.8
2.	Utah International Inc.	8,383	23.1
3.	Nevada Power Co. (captive)	4,190	11.5
4.	Pittsburg & Midway Coal Co.*	3,515	9.7
5.	Colowyo Coal Co.*	3,298	9.1
6.	Utah Power & Light Co. (captive)	2,400	6.6
7.	Pacific Gas & Electric (captive)	2,100	5.8
8.	Public Service Co. of New Mexico (captive)	1,345	3.7
9.	Arizona Electric Power Coop. (captive)	1,100	3.0
10.	Tuscon Gas & Electric (captive)	1,000	2.7
	Total Assured (1986)	36,331	100.0

* Operations owned or controlled by oil companies.

APPENDIX 7

Table A8-1

SUPPLIERS OF COAL FROM THE NORTHERN GREAT PLAINS TO NEW COAL-FIRED UNITS SCHEDULED FOR OPERATION FROM 1977-1986

		Quantity in 10^3 Tons	Percent of Total
1.	Amax*	24,489	18.3
2.	Shell Oil Co.*	18,670	14.0
3.	ARCO*	14,960	11.2
4.	Kerr-McGee*	11,040	8.3
5.	North American Coal Corp.	10,700	8.0
6.	Peabody Coal Co.	7,800	5.8
7.	Sun Oil Co.*	7,650	5.7
8.	Decker Coal Co.	6,000	4.5
9.	Montana Power Co. (captive)	5,665	4.2
10.	Exxon*	4,823	3.6
	Sub-Total	111,797	83.6
	Other	21,957	16.4
	Total Assured (1986)	133,754**	

* Operations owned or controlled by oil companies. Oil companies will account for 81,632 thousand tons of the total 133,754 thousand tons presently assured by contract for 1986 from this region.

** Includes 19,693 thousand tons of captive coal.

APPENDIX 8

CALCULATED SULFUR EMISSIONS AND COMPLIANCE STRATEGY
FOR NEW COAL UNITS PROJECTED TO COME ON-LINE BETWEEN 1977 AND 1981

COMPANY NAME (1)	PLANT NAME AND UNIT NUMBER (2)		INSTALLED CAPACITY (MW) (3)	QUANTITY IN 1000 TONS (4)	COAL QUALITY AV. BTU PER LB. (5)	AV. % SULF (6)	1981 SULFUR EMISSIONS (7)	1981 SULFUR REGULATIONS OLAB (8)	TERMS (9)	COMPLIANCE STRATEGY (10)
ALABAMA ELEC COOP	TOMBIGBEE	2	21C	226	11670	1.55	2.66	1.2C	3	FLUE GAS DESULFURIZATION
ALABAMA ELEC COOP	TOMBIGBEE	3	21C	226	11670	1.55	2.66	1.2C	3	FLUE GAS DESULFURIZATION
ALABAMA PWR CO	MILLER	1	66Z	1CCC	11894	C.7C	1.18	1.2C	3	LOW SULFUR COAL
ALABAMA PWR CO	MILLER	2	66Z	1CCC	11894	C.7C	1.18	1.2C	3	LOW SULFUR COAL
CITY OF APES	APES	8	65	175	1CC00	0.40	C.8C	1.2C	3	LOW SULFUR COAL
APPALACHIAN PWR CO	NEW HAVEN	1	130C	39CC	11CCC	C.60	1.2C	1.2C	3	FLUE GAS DESULFURIZATION
ARIZONA ELEC PWR COOP	APACHE	2	175	550	1C250	0.44	C.8C	0.8C	3	FLUE GAS DESULFURIZATION
ARIZONA ELEC PWR COOP	APACHE	3	175	55C	1C250	0.44	C.8C	0.8C	3	FLUE GAS DESULFURIZATION
ARIZONA PUB SER CO	CHOLLA	2	25C	74C	1CCOC	C.50	1.CC	0.8C	3	FLUE GAS DESULFURIZATION
ARIZONA PUB SER CO	CHOLLA	3	35C	74C	1CCCC	C.50	1.CC	0.8C	3	FLUE GAS DESULFURIZATION
ARIZONA PUB SER CO	CHOLLA	4	35C	1035	1CC00	0.50	1.CC	0.8C	3	FLUE GAS DESULFURIZATION
ARKANSAS PWR & LT CO	WHITE BLUFF	1	70C	20CC	8524	0.48	*	0.2C	5	LOW SULFUR COAL
ASSOCIATED ELEC COOP	THOMAS HILL	3	60C	15CC	5500	5.50	11.5C	1.2C	3	FLUE GAS DESULFURIZATION
ASSOCIATED ELEC COOP	NEW MADRID	2	66C	20CC	1C235	3.20	6.2S	1.2C	3	LOW SULFUR COAL
BASIN ELEC COOP	ANTELOPE VALLEY	1	40C	25CC	66CC	0.66	2.CC	1.2C	3	FLUE GAS DESULFURIZATION
BASIN ELEC COOP	LARAMIE RIVER	1	5CC	2456	8132	0.81	1.99	0.2C	3	FLUE GAS DESULFURIZATION
BASIN ELEC COOP	LARAMIE RIVER	2	5CC	2456	8132	C.81	1.99	C.2C	3	FLUE GAS DESULFURIZATION
BIG RIVERS ELEC COOP	GREEN	1	24C	95C	1C143	3.90	7.69	1.2C	3	FLUE GAS DESULFURIZATION
BIG RIVERS ELEC COOP	GREEN	2	24C	95C	1C143	3.90	7.69	1.2C	3	FLUE GAS DESULFURIZATION
BRAZOS	SAN MIGUEL	1	40C	3CCC	5CCC	1.70	6.8C	1.2C	3	LOW SULFUR COAL
CAJUN ELEC PWR COOP	BIG CAJUN NO 2	1	54C	2CCC	59CC	C.50	1.C9	1.2C	3	LOW SULFUR COAL
CAJUN ELEC PWR COOP	BIG CAJUN NO 2	2	54C	2CCC	59CC	0.50	1.09	1.2C	3	LOW SULFUR COAL
CARDINAL OPERATING CO	CARDINAL	3	61S	1500	11200	2.53	4.52	4.7C	3	LOW SULFUR COAL
CAROLINA PWR & LT	ROXBORO	4	72C	141C	12CCC	1.30	2.3C	2.3C	3	FLUE GAS DESULFURIZATION
CENT ILL PUB SERV CO	NEWTON	1	60C	1340	11050	2.00	4.01	1.2C	3	FLUE GAS DESULFURIZATION
CENT ILL PUB SERV CO	NEWTON	2	60C	14CC	11050	2.00	4.01	1.2C	3	FLUE GAS DESULFURIZATION
CENT PWR & LT CO	COLETO CREEK	1	55C	15CC	1C4CO	0.40	0.7S	1.2C	3	LOW SULFUR COAL
SAN ANTONIO PUB SERV BD	COLLY	1	41S	15CC	815C	C.31	C.7S	1.2C	3	LOW SULFUR COAL
SAN ANTONIO PUB SERV BD	COLLY	2	41S	15CC	8150	C.31	C.7S	1.2C	3	LOW SULFUR COAL
CITY OF COLORADO SPRINGS	NIXON	1	20C	899	9983	C.3C	C.6C	1.2C	3	FLUE GAS DESULFURIZATION
COLORADO UTE	CRAIG	1	38C	12CC	9500	0.40	C.8S	1.2C	3	FLUE GAS DESULFURIZATION
COLORADO UTE	CRAIG	2	38C	12CC	9500	0.40	0.8S	1.2C	3	FLUE GAS DESULFURIZATION
COLUMBUS & SO OHIO	CONESVILLE	6	375	75C	1C315	4.40	8.53	1.2C	3	LOW SULFUR COAL
CONSUMERS PWR CO	J H CAMPBELL	3	8CC	1785	12500	0.80	1.28	1.2C	3	FLUE GAS DESULFURIZATION
COOPERATIVE PWR ASSOC	COAL CREEK	1	44S	2830	6497	C.63	1.94	1.2C	3	FLUE GAS DESULFURIZATION
COOPERATIVE PWR ASSOC	COAL CREEK	2	44S	2830	6497	C.63	1.94	1.2C	3	LOW SULFUR COAL
DAIRYLAND PWR COOP	ALMA	6	35C	100C	8125	0.34	C.8S	1.2C	3	LOW SULFUR COAL
DELMARVA PWR & LT	INDIAN RIVER	4	4CC	8CC	12500	0.70	1.12	1.2C	3	LOW SULFUR COAL
EAST KENTUCKY PWR COOP	SPURLOCK	1	3BC	85C	122CC	C.70	1.19	1.2C	3	LOW SULFUR COAL
EAST KENTUCKY PWR COOP	SPURLOCK	2	3BC	12CC	12200	0.70	1.15	1.2C	3	LOW SULFUR COAL
GAINESVILLE-ALACHUA CNTY	DEERHAVEN	2	23S	6CC	12CCC	C.7C	C.9E	2.7S	2	LOW SULFUR COAL
GEORGIA PWR CO	SCHERER	1	8C1	1CCC	12CCC	0.70	1.17	1.2C	3	LOW SULFUR COAL
GEORGIA PWR CO	WANSLEY	2	87C	1591	11294	2.05	2.03	3.0C	4	LOW SULFUR COAL
GRAND ISLAND PLAICIPAL	PLATTE	1	1CC	35C	8CCC	C.50	-	C.C	1	LOW SULFUR COAL
GRAND RIVER DAM AUTH	STEAM PLANT	1	49C	19CC	8100	0.50	1.23	1.2C	3	LOW SULFUR COAL
HOOSIER ENERGY DIVISION	PERCH	1	49C	139C	1C7C0	3.70	6.92	1.2C	3	FLUE GAS DESULFURIZATION
HOOSIER ENERGY DIVISION	PERCH	2	49C	139C	1C7C0	3.70	6.92	1.2C	3	FLUE GAS DESULFURIZATION
HOUSTON LT & PWR CO	PARISH	5	66C	241C	9426	0.26	C.5S	1.2C	3	LOW SULFUR COAL
HOUSTON LT & PWR CO	PARISH	6	66C	241C	9426	0.26	0.5S	1.2C	3	LOW SULFUR COAL
HOUSTON LT & PWR CO	PARISH	7	60C	23CC	5426	0.26	C.5S	1.2C	3	LOW SULFUR COAL
ILLINOIS PWR CO	HAVANA	6	45C	640	1CC00	0.60	1.2C	1.2C	3	LOW SULFUR COAL
IND-MICH ELEC CO	ROCKPORT	1	1300	45CC	1CC00	C.60	1.2C	1.2C	3	FLUE GAS DESULFURIZATION
INDIANAPOLIS PWR & LT	PETERSBURG	3	51S	19CC	10970	2.40	4.38	1.2C	3	LOW SULFUR COAL
INTERSTATE PWR CO	LANSING	4	27A	8EC	8C20	0.48	1.2C	1.2C	3	LOW SULFUR COAL
IOWA PUB SERV CO	NEAL	4	58S	1781	9500	0.65	1.37	1.2C	3	LOW SULFUR COAL
IOWA PWR & LT CO	COUNCIL BLUFFS	3	65C	25CC	8C25	C.50	1.25	1.2C	3	LOW SULFUR COAL
IOWA SC LTIL CO	CTYLPWA	1	72A	2CCC	8C2C	C.48	1.2C	1.2C	3	LOW SULFUR COAL
IOWA STATE UNIVERSITY	HEATING PLANT	4	11	4C	11CC0	0.70	1.27	1.2C	3	LOW SULFUR COAL
K C PWR & LT CO	LA CYGNE	2	69C	184C	9126	0.32	C.7C	1.2C	3	LOW SULFUR COAL
K C PWR & LT	IATAN	1	63C	2CCC	8100	0.40	0.9S	1.2C	3	LOW SULFUR COAL
K C BC CP PUB UTIL	NEARMAN CREEK	1	23S	6E0	8CC0	C.40	C.9S	1.5C	3	LOW SULFUR COAL
KENTUCKY UTIL	GHENT	2	55A	1CCC	11CC0	C.70	1.27	1.2C	3	LOW SULFUR COAL
KENTUCKY UTIL	GHENT	3	55A	1CCC	11CC0	0.70	1.27	1.2C	3	LOW SULFUR COAL
CITY OF LANELANC	PCINTCSH	3	36A	864	11500	3.30	5.7A	1.2C	3	FLUE GAS DESULFURIZATION
LOUISVILLE GAS & ELEC	MILL CREEK	3	42S	1039	1C920	3.00	6.9A	1.2C	3	FLUE GAS DESULFURIZATION
LOUISVILLE GAS & ELEC	MILL CREEK	4	49S	1625	1C920	3.00	6.9A	1.2C	3	FLUE GAS DESULFURIZATION
LOWER CCLC RIVER AUTH	FAYETTE	1	55C	2CCC	92C0	C.50	1.09	1.2C	3	LOW SULFUR COAL
LOWER CCLC RIVER AUTH	FAYETTE	2	55C	2CCC	92C0	C.50	1.C9	1.2C	3	LOW SULFUR COAL
MINNESOTA PWR & LT	BOSWELL	4	5CC	22CC	8724	0.89	1.02	1.2C	2	FLUE GAS DESULFURIZATION
MINNESOTA PWR COOP	SQUARE BUTTE	1	43C	3CCC	64CC	0.70	1.09	1.2C	2	FLUE GAS DESULFURIZATION
MISSISSIPPI PWR CO	JACKSON COUNTY	1	503	732	11CC0	0.70	1.27	1.2C	3	LOW SULFUR COAL
MISSISSIPPI PWR CO	JACKSON COUNTY	2	503	732	11CC0	0.70	1.27	1.2C	3	LOW SULFUR COAL
MONONGAHELA PWR CO	PLEASANTS	1	63A	19CC	12CC0	3.50	5.83	1.2C	3	FLUE GAS DESULFURIZATION
MONONGAHELA PWR CO	PLEASANTS	2	62A	19CC	12CC0	3.50	5.83	1.2C	3	FLUE GAS DESULFURIZATION
MONTANA-DAKOTA UTIL	GLENCYCTE	1	41C	22C0	7C46	C.80	2.27	1.2C	3	LOW SULFUR COAL
NEBRASKA PUB PWR DIST	GENTLEMAN	1	60C	2CCC	8900	0.31	0.7C	4.2C	2	LOW SULFUR COAL
NEBRASKA PUB PWR DIST	GENTLEMAN	2	60C	2000	8900	0.31	0.7C	1.2C	3	LOW SULFUR COAL
N INDIANA PUB SERV CO	SCHAFFER	015	55A	15CC	1CC00	0.60	1.2C	1.2C	3	LOW SULFUR COAL
N STATES PWR CO	SHERBURNE COUNTY	2	72C	22C0	8600	0.80	1.86	C.9A	3	FLUE GAS DESULFURIZATION
N STATES PWR CO	SHERBURNE COUNTY	3	86C	25C0	8600	0.80	1.86	0.9A	3	FLUE GAS DESULFURIZATION
OKLAHOMA GAS & ELEC	MUSKOGEE	4	51S	15CC	86C0	C.33	C.7T	1.2C	3	LOW SULFUR COAL
OKLAHOMA GAS & ELEC	MUSKOGEE	5	51S	15CC	86C0	C.33	C.7T	1.2C	3	LOW SULFUR COAL
OKLAHOMA GAS & ELEC	SCONER	1	51S	15CC	8300	0.30	C.72	1.2C	3	LOW SULFUR COAL
OKLAHOMA GAS & ELEC	SCONER	2	51S	15CC	83C0	C.30	C.72	1.2C	3	LOW SULFUR COAL
OMAHA PUB PWR DIST	NEBRASKA CITY	1	57S	2019	8079	0.33	0.82	1.2C	3	LOW SULFUR COAL
PACIFIC PWR & LT	MEEGER	4	50C	166C	93CC	0.50	1.0C	0.2C	3	FLUE GAS DESULFURIZATION
PACIFIC PWR & LT	DAVEAN	1	33C	16CC	7900	C.42	1.C4	0.5C	3	UNKNOWN
PENNSYLVANIA ELEC CO	HOMER CITY	3	65C	13CC	12550	2.50	3.99	1.2C	3	COAL WASHING
PENNSYLVANIA PWR CO	PANSPIELC	2	80S	3CCC	11700	3.00	6.5C	0.6C	4	FLUE GAS DESULFURIZATION
PENNSYLVANIA PWR CO	PANSPIELC	3	82S	17C0	11700	3.00	6.5C	0.6C	3	FLUE GAS DESULFURIZATION
PORTLAND GENERAL ELEC	BOARDMAN	1	5CC	12CC	8025	0.48	1.2C	1.2C	3	LOW SULFUR COAL
PUB SERV CO CF N M	SAN JUAN	3	44C	19CC	91CC	C.9C	1.8S	0.3A	3	FLUE GAS DESULFURIZATION
PUB SERV CO CF N M	SAN JUAN	4	44A	2817	9700	C.9C	1.8A	0.3A	3	FLUE GAS DESULFURIZATION
PUB SERV CO OF INDIANA	GIBSON	3	63J	1346	10900	3.3C	-	C.C	1	NO REGULATIONS
PUB SERV CO OF INDIANA	GIBSON	4	63J	1346	10900	3.3C	-	C.C	1	NO REGULATIONS

CODE FOR SULFUR EMISSION REGULATIONS
1 - NO REGULATIONS
2 - LBS OF SULFUR PER MILLION BTU
3 - LBS OF SULFUR DI-OXIDE (SO2) PER MILLION BTU
4 - % SULFUR BY WEIGHT
5 - PARTS PER MILLION PER AMBIENT AIR
6 - CONTINUOUS MONITORING REQUIRED
NOTE: SULFUR EMISSIONS IN COLUMN 7 ARE IN THE SAME UNITS AS SULFUR REGULATIONS (COLUMNS 8 AND 9)

APPENDIX 9

TABLE A9-1 (continued)

CALCULATED SULFUR EMISSIONS AND COMPLIANCE STRATEGY
FOR NEW COAL UNITS PROJECTED TO COME ON LINE BETWEEN 1977 AND 1981

COMPANY NAME (1)	PLANT NAME AND UNIT NUMBER (2)		INSTALLED CAPACITY (MW) (3)	QUANTITY IN (1000 TONS) (4)	COAL QUALITY Av. BTU PER LB. (5)	COAL QUALITY Av. % SULF (6)	1981 SULFUR EMISSIONS (7)	1981 SULFUR REGULATIONS GLOB (8)	1981 SULFUR REGULATIONS TERMS (9)	COMPLIANCE STRATEGY (10)
PUB SERV CO OF COLORADO	PAWNEE	1	500	1720	8163	0.38	0.93	1.20	3	LOW SULFUR COAL
PUB SERV CO OF OKLA-CPA	NORTHEASTERN	3	450	2023	8125	0.48	1.18	1.20	3	LOW SULFUR COAL
PUB SERV CO OF OKLA-CPA	NORTHEASTERN	4	450	2023	8125	0.48	1.18	1.20	3	LOW SULFUR COAL
SALT RIVER PROJECT	CORONADO	1	350	1100	10500	1.00	1.90	0.80	3	FLUE GAS DESULFURIZATION
SALT RIVER PROJECT	CORONADO	2	350	1100	10500	1.00	1.90	0.80	3	FLUE GAS DESULFURIZATION
SIERRA PACIFIC PWR CO	VALMY	1	250	700	11500	0.55	0.96	1.20	3	LOW SULFUR COAL
S C PUB SERV AUTH	WINYAH	2	280	463	11200	1.90	3.39	1.20	3	FLUE GAS DESULFURIZATION
SOUTH MISSISSIPPI EPA	PORRON	1	180	253	12000	1.00	1.67	1.20	3	FLUE GAS DESULFURIZATION
SOUTH MISSISSIPPI EPA	PORRON	2	180	253	12000	1.00	1.67	1.20	3	FLUE GAS DESULFURIZATION
SC ILLINOIS PWR COOP	PARISH	4	160	150	10000	3.20	6.40	1.20	3	FLUE GAS DESULFURIZATION
SC INDIANA GAS & ELEC	BROWN	1	265	700	10500	3.50	6.67	1.20	3	FLUE GAS DESULFURIZATION
SOUTHWESTERN PUB SERV CO	HARRINGTON	2	317	947	8700	0.52	1.20	1.20	3	LOW SULFUR COAL
SOUTHWESTERN PUB SERV CO	HARRINGTON	3	317	376	8700	0.52	1.20	1.20	3	LOW SULFUR COAL
SOUTHWESTERN ELEC PWR	FLINT CREEK	1	528	1660	8250	0.35	0.85	1.20	3	LOW SULFUR COAL
SOUTHWESTERN ELEC PWR	WELCH	1	528	1470	8250	0.35	0.85	1.20	3	LOW SULFUR COAL
SOUTHWESTERN ELEC PWR	WELCH	2	528	1470	8250	0.35	0.85	1.20	3	LOW SULFUR COAL
SPRINGFIELD MUNICIPAL	CALLAN	3	175	500	10500	3.10	5.90	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR PWR AGENCY	GIBBONS CREEK	1	400	2795	4800	1.30	5.42	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR & LT	FOREST GROVE	1	750	4000	7199	0.70	1.94	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR & LT	MARTIN LAKE	1	750	4168	7400	0.90	2.43	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR & LT	MARTIN LAKE	2	750	4168	7400	0.90	2.43	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR & LT	MARTIN LAKE	3	750	4168	7400	0.90	2.43	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR & LT	MARTIN LAKE	4	750	3551	7400	0.90	2.43	1.20	3	FLUE GAS DESULFURIZATION
TEXAS PWR & LT	MONTICELLO	3	750	3915	6200	0.60	1.94	1.20	3	FLUE GAS DESULFURIZATION
CINCINNATI GAS & ELEC	EAST BEND	2	600	1500	11000	4.20	7.64	1.20	3	FLUE GAS DESULFURIZATION
CINCINNATI GAS & ELEC	MIAMI FORT	8	545	1200	12000	0.70	1.17	1.20	3	LOW SULFUR COAL
THE DAYTON PWR & LT	KILLEN	1	600	850	11400	0.55	0.98	1.20	3	LOW SULFUR COAL
THE KANSAS PWR & LT CO	JEFFERY ENERGY	1	680	2725	8025	0.32	0.80	1.20	3	FLUE GAS DESULFURIZATION
THE KANSAS PWR & LT CO	JEFFERY ENERGY	2	680	2098	8025	0.32	0.80	1.20	3	FLUE GAS DESULFURIZATION
THE MONTANA PWR CO	COLSTRIP	3	700	2833	8554	0.78	1.82	1.20	3	FLUE GAS DESULFURIZATION
THE UNION ELEC CO	RUSH ISLAND	2	575	1400	11000	1.20	2.26	2.30	3	LOW SULFUR COAL
UPPER PENINSULA GEN CO	PRESQUE ISLE	7	80	333	9050	0.50	1.28	1.20	3	LOW SULFUR COAL
UPPER PENINSULA GEN CO	PRESQUE ISLE	8	80	333	9050	0.50	1.28	1.20	3	LOW SULFUR COAL
UPPER PENINSULA GEN CO	PRESQUE ISLE	9	80	333	9050	0.50	1.28	1.20	3	LOW SULFUR COAL
UTAH PWR & LT	EMERY	1	400	800	11700	0.55	0.94	**		FLUE GAS DESULFURIZATION
UTAH PWR & LT	EMERY	2	400	800	11700	0.55	0.94	**		FLUE GAS DESULFURIZATION
UTAH PWR & LT	HUNTINGTON CANYON	1	415	800	12200	0.48	0.75	**		FLUE GAS DESULFURIZATION
WISCONSIN ELEC PWR CO	PLEASANT PRAIRIE	1	580	1500	8100	0.35	0.86	1.20	3	LOW SULFUR COAL
WISCONSIN PWR & LT CO	COLUMBIA	2	527	1700	8322	0.40	0.96	1.20	3	LOW SULFUR COAL

CODE FOR SULFUR EMISSION REGULATIONS
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3 - LBS OF SULFUR DI-OXIDE (SO2) PER MILLION BTU
4 - % SULFUR BY WEIGHT
5 - PARTS PER MILLION SO2 AMBIENT AIR
* - CONTINUOUS MONITORING REQUIRED
WHERE SULFUR EMISSIONS IN COLUMN 7 ARE IN THE SAME UNITS AS SULFUR REGULATIONS (COLUMNS 8 AND 9)

** THE SULFUR REGULATIONS FOR UTAH POWER & LIGHT'S EMERY #162 AND HUNTINGTON CANYON #1 UNITS STIPULATE 80 PERCENT CONTROL OF INPUT SULFUR.

TABLE A10-1

STATE AND REGIONAL LISTING OF NEW COAL UNITS
SCHEDULED FOR OPERATION BETWEEN 1977-1986

STATE AND GEOGRAPHIC REGION	UTILITY	PLANT	UNIT ID	CAPACITY (MW)	MONTH/YEAR ON LINE OR STREAM	1981 DEMAND (1000 TONS) TOTAL/CONTRACTED	1986 DEMAND (1000 TONS) TOTAL/CONTRACTED
CONN	-	-	-	-	-	-	-
ME	-	-	-	-	-	-	-
MASS	-	-	-	-	-	-	-
N H	-	-	-	-	-	-	-
R I	-	-	-	-	-	-	-
VT	-	-	-	-	-	-	-
NEW ENGLAND REGION							
N Y	PWR AUTHORITY OF N Y	POAS	0 1	300	9/1982	0/ 0	1500/ 0
N Y	N Y STATE ELEC & GAS	CAYUGA	0 1	850	11/1983	0/ 0	2327/ 0
N Y	NIAGRA MOHAWK PWR CORP	LAKE ERIE	0 1	850	11/1985	0/ 0	3000/ 0
P A	PENNSYLVANIA PWR CO	MANSFIELD	0 2	800	10/1977	3000/3000	3000/3000
P A	PENNSYLVANIA ELEC CO	NEW CASTLE	0 3	650	12/1977	1300/1300	1300/1300
P A	PENNSYLVANIA PWR CO	MANSFIELD	0 3	625	10/1980	1700/ 0	1700/ 0
P A	WEST PENN PWR CO	UNSITED	0 1	630	3/1984	0/ 0	1500/ 0
P A	PENNSYLVANIA ELEC CO	SEWARD	0 7	800	5/1984	0/ 0	1900/ 0
P A	WEST PENN PWR CO	UNSITED	0 2	630	3/1985	0/ 0	1500/ 0
P A	WEST PENN PWR CO	UNSITED	0 3	630	3/1986	0/ 0	1500/ 0
P A	PENNSYLVANIA ELEC CO	CONC	0 1	800	5/1986	0/ 0	1900/ 0
N J	-	-	-	-	-	-	-
MID ATLANTIC REGION							
ILL	CENT ILL PUB SERV CO	NEWTON	0 1	600	12/1977	1340/1340	1400/1400
ILL	ILLINOIS PWR CO	HAVANA	0 6	450	6/1978	640/ 185	650/ 0
ILL	SPRINGFIELD MUNICIPAL	CALLMAN	0 3	175	6/1978	500/ 0	500/ 0
ILL	SO ILLINOIS PWR COOP	MARION	0 4	160	6/1978	150/ 150	325/ 325
ILL	CENT ILL PUB SERV CO	NEWTON	0 2	600	3/1981	1400/ 0	1400/ 0
ILL	CENT ILLINOIS LT	DUCK CREEK	0 2	400	1/1982	0/ 0	950/ 950
ILL	N ILLINOIS PWR COOP	PEARL	0 2	400	6/1984	0/ 0	620/ 0
ILL	CENT ILL PUB SERV CO	PLANT X	0 1	600	3/1985	0/ 0	1867/ 0
ILL	ILLINOIS PWR CO	UNSITED	0 1	600	6/1986	0/ 0	900/ 0
IND	INDIANAPOLIS PWR & LT	PETERSBURG	0 3	515	10/1977	1900/1900	1900/1900
IND	PUB SERV CO OF INDIANA	GIBSON	0 3	637	3/1978	1346/1346	1433/1433
IND	PUB SERV CO OF INDIANA	GIBSON	0 4	637	3/1978	1346/1346	1433/1433
IND	SO INDIANA GAS & ELEC	BROWN	0 1	265	4/1979	700/ 700	700/ 700
IND	N INDIANA PUB SERV CO	SCHAHFER	015	556	5/1979	1500/ 0	1900/ 0
IND	WCCSIER ENERGY DIVISION	PERCP	0 2	490	12/1980	1350/ 0	1350/ 0
IND	WCCSIER ENERGY DIVISION	PERCP	0 1	490	9/1981	1350/ 0	1350/ 0
IND	IND-MICH ELEC CO	ROCKPORT	0 1	1300	12/1981	4500/4500	4500/4500
IND	INDIANAPOLIS PWR & LT	PETERSBURG	0 4	515	4/1982	0/ 0	1300/1110
IND	IND-MICH ELEC CO	ROCKPORT	0 2	1300	12/1982	0/ 0	4500/4500
IND	SO INDIANA GAS & ELEC	BROWN	0 2	265	4/1983	0/ 0	800/ 0
IND	INDIANAPOLIS PWR & LT	PEKIOG BOTTOM	0 1	650	4/1985	0/ 0	1430/ 0
MICH	UPPER PENINSULA GEN CO	PRESQUE ISLE	0 7	80	4/1979	333/ 333	333/ 333
MICH	UPPER PENINSULA GEN CO	PRESQUE ISLE	0 8	80	5/1978	333/ 333	333/ 333
MICH	UPPER PENINSULA GEN CO	PRESQUE ISLE	0 9	80	1/1979	333/ 333	333/ 333
MICH	CONSUMERS PWR CO	J H CAMPBELL	0 3	800	5/1980	1785/ 161	1785/ 0
MICH	THE DETROIT EDISON CO	BELLE RIVER	0 1	697	3/1982	0/ 0	2000/2000
MICH	GRAND RAPIDS MUNICIPAL	ISLAND	0 9	80	8/1982	0/ 0	270/ 0
MICH	COLDWATER MUNICIPAL	COLDWATER	0 7	25	8/1982	0/ 0	80/ 0
MICH	UPPER PENINSULA PWR CO	DOLLAR BAY	0 1	40	10/1982	0/ 0	250/ 0
MICH	THE DETROIT EDISON CO	BELLE RIVER	0 2	697	3/1983	0/ 0	2000/2000
MICH	CONSUMERS PWR CO	UNSITED	0 1	690	3/1986	0/ 0	1200/ 0
OHIO	CARDINAL OPERATING CO	CARDINAL	0 3	615	8/1977	1500/1500	1500/1500
OHIO	COLUMBUS & SO OHIO	CONESVILLE	0 6	375	1/1978	750/ 750	750/ 750
OHIO	CINCINNATI GAS & ELEC	MIAMI FORT	0 8	549	1/1978	1200/ 300	1200/ 300
OHIO	THE DAYTON PWR & LT	KILLEN	0 1	600	1/1981	850/ 850	850/ 850
OHIO	THE DAYTON PWR & LT	KILLEN	0 2	600	1/1983	0/ 0	850/ 850
OHIO	COLUMBUS & SO OHIO	POSTON	0	375	1/1983	0/ 0	800/ 0
OHIO	COLUMBUS & SO OHIO	POSTON	0	375	1/1985	0/ 0	800/ 0
WISC	WISCONSIN PWR & LT CO	COLUMBIA	0 2	527	3/1978	1700/1700	1700/1700
WISC	DAIRYLAND PWR COOP	ALMA	0 6	350	5/1979	1000/1000	1000/1000
WISC	WISCONSIN ELEC PWR CO	PLEASANT PRAIRIE	0 1	500	4/1980	1500/1500	1500/1500
WISC	WISCONSIN PUB SER CO	WESTON	0 3	300	3/1982	0/ 0	1000/1000
WISC	WISCONSIN ELEC PWR CO	PLEASANT PRAIRIE	0 2	500	4/1982	0/ 0	1500/ 990
WISC	WISCONSIN PWR & LT CO	EDGEWATER	0 5	400	6/1983	0/ 0	1000/ 0
WISC	WISCONSIN ELEC PWR CO	MCSHENAG	0 1	400	6/1984	0/ 0	1700/ 0
WISC	WISCONSIN ELEC PWR CO	MCSHENONG	0 2	400	6/1985	0/ 0	1700/ 0
WISC	WISCONSIN PUB SER CO	WESTON	0 4	300	6/1958	0/ 0	1000/ 0
EAST NORTH CENTRAL REGION							
IA	IOWA STATE UNIVERSITY	HEATING PLANT	0 4	11	5/1977	40/ 40	40/ 40
IA	INTERSTATE PWR CO	LANSING	0 4	274	6/1977	800/ 800	800/ 800
IA	IOWA PWR & LT CO	COUNCIL BLUFFS	0 3	690	1/1979	2500/2500	2500/2500
IA	IOWA PUB SERV CO	NEAL	0 4	585	5/1979	1781/ 0	1781/ 0
IA	IOWA SO UTIL CO	OTTUMWA	0 1	720	12/1980	2000/2000	2000/2000
IA	CITY OF AMES	AMES	0 8	65	6/1981	175/ 0	175/ 0
IA	PLUSCATINE MUNICIPAL	PLUSCATINE	0 9	100	6/1982	0/ 0	450/ 0
IA	IOWA ILL GAS & ELEC	LOUISA	0 1	680	1/1983	0/ 0	2000/ 0

APPENDIX 10

TABLE A10-1 (continued)

STATE AND REGIONAL LISTING OF NEW COAL UNITS
SCHEDULED FOR OPERATION BETWEEN 1977-1986

STATE AND GEOGRAPHIC REGION	UTILITY	PLANT	UNIT ID	CAPACITY (MW)	MONTH/YEAR CUE ON STREAM	1981 EXPANS (1000 TONS) TOTAL/CONTRACTED	1986 EXPANS (1000 TONS) TOTAL/CONTRACTED
KAN	K C PWR & LT CO	LA CYGNE	0 2	430	4/1977	1860/1860	1860/1860
KAN	THE KANSAS PWR & LT CO	JEFFERY ENERGY	0 1	680	6/1978	2725/2725	2090/2090
KAN	K C DE CP PUB UTIL	NEARMAN CREEK	0 1	235	1/1980	600/ 0	600/ 0
KAN	THE KANSAS PWR & LT CO	JEFFERY ENERGY	0 2	680	6/1980	2090/2090	2090/2090
KAN	THE KANSAS PWR & LT CO	JEFFERY ENERGY	0 3	680	6/1982	0/ 0	2097/2097
KAN	SUNFLOWER ELEC COOP	GARDEN CITY	0 1	220	10/1982	0/ 0	815/ 0
KAN	THE KANSAS PWR & LT CO	JEFFERY ENERGY	0 4	680	6/1984	0/ 0	2097/2097
KAN	K C DE CP PUB UTIL	NEARMAN CREEK	0 2	300	6/1985	0/ 0	840/ 0
PINN	N STATES PWR CO	SHERBURNE COUNTY	0 2	720	4/1977	2200/2200	2200/2200
PINN	PINNESOTA PWR & LT	ROSWELL	0 4	500	5/1980	2200/2200	2200/2200
PINN	N STATES PWR CO	SHERBURNE COUNTY	0 3	860	5/1981	2950/ 0	2550/ 0
PINN	N STATES PWR CO	SHERBURNE COUNTY	0 4	860	5/1987	0/ 0	2500/ 0
PINN	PINNESOTA PWR & LT	PINE LAKES	0 1	800	11/1984	0/ 0	3500/ 0
PINN	N STATES PWR CO	UNSITED	0 1	860	5/1985	0/ 0	3100/ 0
PC	THE UNION ELEC CO	RUSH ISLAND	0 2	575	1/1977	1400/1400	1250/1250
PC	ASSOCIATED ELEC COOP	NEW MADRID	0 2	600	6/1977	2000/2000	2000/2000
PO	K C PWR & LT	IATAN	0 1	630	4/1980	2000/2000	2000/2000
PO	ASSOCIATED ELEC COOP	THOMAS HILL	0 3	600	6/1981	1500/ 0	1500/ 0
PC	EMPIRE DISTRICT ELEC	EMPIRE DIST CENT	0 3	300	6/1985	0/ 0	750/ 0
PO	CITY OF SPRINGFIELD	SOUTHWEST	0 2	250	7/1985	0/ 0	500/ 0
NEB	NEBRASKA PUB PWR DIST	GENTLEMAN	0 1	600	5/1978	2000/2000	2000/2000
NEB	OMAHA PUB PWR DIST	NEBRASKA CITY	0 1	570	5/1979	2010/2010	2323/2323
NEB	NEBRASKA PUB PWR DIST	GENTLEMAN	0 2	600	5/1980	2000/2000	2000/2000
NEB	GRAND ISLAND MUNICIPAL	PLATTE	0 1	100	6/1981	350/ 0	350/ 0
N D	MINNKOTA PWR COOP	SQUARE BUTTE	0 2	430	5/1977	3000/3000	3000/3000
N D	COOPERATIVE PWR ASSOC	COAL CREEK	0 1	600	11/1978	2850/2850	2850/2850
N D	COOPERATIVE PWR ASSOC	COAL CREEK	0 2	600	11/1979	2850/2850	2850/2850
N D	MONTANA-DAKOTA UTIL	COYOTE	0 1	410	5/1981	2200/2200	2200/2200
N D	BASIN ELEC COOP	ANTELOPE VALLEY	0 1	600	5/1981	2500/2500	2500/2500
N D	BASIN ELEC COOP	ANTELOPE VALLEY	0 2	600	6/1982	0/ 0	2300/2300
N D	MONTANA-DAKOTA UTIL	COYOTE	0 2	410	1/1989	0/ 0	2200/2200
S E WEST NORTH CENTRAL REGION	-	-	-	-	-	-	-
DELA	DELMARVA PWR & LT	INDIAN RIVER	0 4	400	5/1979	800/ 0	800/ 0
FLOR	GAINESVILLE-ALACHUA CNTY	DEERHAVEN	0 2	235	1/1981	450/ 0	600/ 0
FLOR	CITY OF LAKELAND	MCINTOSH	0 3	366	10/1981	800/ 0	866/ 0
FLOR	GULF PWR CO	ELLIS	0 1	900	6/1982	0/ 0	1600/ 0
FLOR	FLORIDA PWR CORP	CRYSTAL RIVER	0 4	400	10/1982	0/ 0	1600/ 0
FLOR	GULF PWR CO	ELLIS	0 2	900	6/1984	0/ 0	1600/ 0
FLOR	FLORIDA PWR CORP	CRYSTAL RIVER	0 5	400	10/1984	0/ 0	1600/ 0
FLOR	TAMPA ELEC CO	BIG BEND	0 4	420	5/1986	0/ 0	900/ 0
FLOR	FLORIDA PWR CORP	UNSITED	0 1	400	10/1988	0/ 0	1600/ 0
GA	GEORGIA PWR CO	HANSLEY	0 2	870	6/1978	1951/1951	1951/1951
GA	GEORGIA PWR CO	SCHERER	0 1	801	6/1981	1800/1800	1800/1800
GA	GEORGIA PWR CO	SCHERER	0 2	801	6/1982	0/ 0	1800/1800
GA	SAVANNAH ELEC & PWR CO	OFFINGHAM	0 2	239	6/1984	0/ 0	470/ 0
GA	GEORGIA PWR CO	SCHERER	0 3	801	6/1984	0/ 0	1800/1800
GA	GEORGIA PWR CO	SCHERER	0 4	801	6/1989	0/ 0	1800/1800
GA	GEORGIA PWR CO	SITE QC	0 1	801	6/1986	0/ 0	1800/ 0
GA	GEORGIA PWR CO	SITE C	0 1	801	6/1988	0/ 0	1800/ 0
MD	POTOMAC ELECTRIC CO	DICKERSON	0 4	800	12/1984	0/ 0	1500/ 0
N C	CAROLINA PWR & LT	ROXBORO	0 4	720	5/1980	1410/1410	1444/1444
N C	CAROLINA PWR & LT	PAYC	0 1	720	5/1983	0/ 0	1439/1439
N C	CAROLINA PWR & LT	PAYC	0 2	720	5/1989	0/ 0	1439/1439
S C	S C PUB SERV AUTH	WINYAH	0 2	280	5/1977	443/ 443	440/ 0
S C	S C PUB SERV AUTH	WINYAH	0 3	280	5/1980	0/ 0	440/ 0
S C	S C PUB SERV AUTH	WINYAH	0 4	235	5/1984	0/ 0	440/ 0
S C	S C ELEC & GAS CO	UNSITED	0 1	900	5/1984	0/ 0	300/ 0
S C	S C PUB SERV AUTH	UNSITED	0 1	950	6/1986	0/ 0	687/ 0
W VA	POTOMAC EDISON PWR CO	PLEASANTS	0 1	630	5/1979	1500/ 0	1500/ 0
W VA	POTOMAC EDISON PWR CO	PLEASANTS	0 2	630	5/1980	1500/ 0	1500/ 0
W VA	APPALACHIAN PWR CO	NEW HAVEN	0 1	1300	10/1980	3000/ 0	3000/ 0
E C VA SOUTH ATLANTIC REGION	- -	- -	- -	- -	- -	- -	- -
ALA	ALABAMA PWR CO	MILLER	0 1	660	6/1978	1500/ 0	1500/ 0
ALA	ALABAMA ELEC COOP	TOMBIGBEE	0 2	210	6/1978	330/ 330	300/ 300
ALA	ALABAMA ELEC COOP	TOMBIGBEE	0 3	210	6/1979	330/ 330	300/ 300
ALA	ALABAMA PWR CO	MILLER	0 2	660	6/1981	1500/ 0	1500/ 0
ALA	ALABAMA PWR CO	MILLER	0 3	660	6/1982	0/ 0	1500/ 0
ALA	ALABAMA PWR CO	MILLER	0 4	660	6/1989	0/ 0	1500/ 0

APPENDIX 10 (continued)

TABLE A10-1 (continued)

STATE AND REGIONAL LISTING OF NEW COAL UNITS SCHEDULED FOR OPERATION BETWEEN 1979-1986

STATE AND GEOGRAPHIC REGION	UTILITY	PLANT	UNIT ID	CAPACITY (MW)	MONTH/YEAR DUE ON STREAM	1981 DEMAND (1000 TONS) TOTAL/CONTRACTED	1986 DEMAND (1000 TONS) TOTAL/CONTRACTED
ALA	ALABAMA PWR CO	SITE A	1	801	6/1984	C/ C	1300/ C
ALA	ALABAMA PWR CO	SITE A	2	801	6/1985	C/ C	1300/ C
ALA	ALABAMA PWR CO	SITE A	3	801	6/1986	C/ C	1300/ C
ALA	ALABAMA PWR CO	SITE B	1	801	6/1988	C/ C	1300/ C
KY	KENTUCKY UTIL	GREAT	2	556	6/1977	1000/1000	1000/1000
KY	EAST KENTUCKY PWR COOP	SPURLOCK	1	300	5/1977	890/ 890	890/ C
KY	LOUISVILLE GAS & ELEC	PILL CREEK	3	425	6/1978	1035/1035	1035/1035
KY	BIG RIVERS ELEC COOP	GREEN	1	240	12/1979	950/ 950	950/ 950
KY	CINCINNATI GAS & ELEC	EAST BEND	2	600	1/1980	1900/ C	1900/ C
KY	EAST KENTUCKY PWR COOP	SPURLOCK	2	500	6/1980	1200/ 0	1200/ C
KY	LOUISVILLE GAS & ELEC	PILL CREEK	4	495	6/1980	1025/1025	1215/1215
KY	BIG RIVERS ELEC COOP	GREEN	2	240	12/1980	950/ C	950/ C
KY	KENTUCKY UTIL	GHENT	3	556	5/1981	1000/ 0	1000/ C
KY	KENTUCKY UTIL	TRIPPLE COUNTY	1	495	6/1982	C/ 0	1215/1215
KY	CINCINNATI GAS & ELEC	EAST BEND	1	600	1/1983	C/ C	1900/ C
KY	KENTUCKY UTIL	GHENT	4	556	5/1983	C/ 0	1000/ C
KY	EAST KENTUCKY PWR COOP	UNSITED	1	500	6/1984	0/ 0	850/ C
KY	LOUISVILLE GAS & ELEC	TRIPPLE COUNTY	2	495	6/1985	C/ C	1215/1215
KY	KENTUCKY UTIL	UNSITED	1	650	10/1985	C/ 0	1170/ C
MISS	MISSISSIPPI PWR CO	JACKSON COUNTY	1	503	6/1977	732/ 732	732/ 732
MISS	SOUTH MISSISSIPPI EPA	PERRY	1	180	6/1978	293/ 293	636/ 636
MISS	SOUTH MISSISSIPPI EPA	PERRY	2	180	6/1978	293/ 293	636/ 636
MISS	MISSISSIPPI PWR CO	JACKSON COUNTY	2	503	6/1980	732/ 732	732/ 732
MISS	MISS PWR & LT	MISSISSIPPI COAL	1	700	1/1985	C/ 0	2850/ C
MISS	MISSISSIPPI PWR CO	UNSITED	1	503	6/1985	C/ C	732/ C
TEXAS EAST SOUTH CENTRAL REGION	-	-	-	-	-	-	-
ARK	SOUTHWESTERN ELEC PWR	FLINT CREEK	1	530	5/1978	1660/1660	1760/1760
ARK	ARKANSAS PWR & LT CO	WHITE BLUFF	1	700	1/1980	2000/2000	2000/2000
ARK	ARKANSAS PWR & LT CO	WHITE BLUFF	2	700	1/1982	0/ 0	2000/2000
ARK	ARKANSAS PWR & LT CO	ARK COAL	1	700	1/1983	C/ 0	2000/2000
ARK	ARKANSAS ELEC COOP	UNSITED	1	500	6/1984	C/ C	1750/ C
ARK	ARKANSAS PWR & LT CO	ARK COAL	2	700	1/1985	0/ 0	2000/2000
LA	CAJUN ELEC PWR COOP	BIG CAJUN NO 2	1	540	7/1979	2000/2000	2000/2000
LA	CAJUN ELEC PWR COOP	BIG CAJUN NO 2	2	540	7/1980	2000/2000	2000/2000
LA	CITY OF NATCHITOCHES	LAMPOC[illegible] GASP	1	109	6/1982	C/ C	194/ C
LA	GULF STATES UTIL	ACADIA/ACADIA	2	530	3/1984	C/ C	1750/1750
LA	CAJUN ELEC PWR COOP	BIG CAJUN NO 2	3	540	7/1985	0/ 0	2000/2000
LA	LOUISIANA PWR & LT	LOUISIANA	1	300	1/1984	C/ C	2000/ C
LA	LOUISIANA PWR & LT	LOUISIANA	2	300	1/1986	0/ C	2000/ C
LA	GULF STATES UTIL	NELSON	5	540	9/1986	0/ 0	2067/2067
COLO	COLORADO GAS & ELEC	PLSHOGEE	4	515	2/1977	1500/1500	1900/1900
COLO	COLORADO GAS & ELEC	PUSHOGEE	5	515	2/1978	1900/1900	1900/1900
COLO	COLORADO GAS & ELEC	SCENER	1	515	2/1979	1900/1900	1900/1900
COLO	PUB SERV CO OF COLORADO	NORTHEASTERN	3	450	6/1979	2021/2029	1901/1901
COLO	COLORADO GAS & ELEC	SCONER	2	515	2/1980	1900/1900	1900/1900
COLO	PUB SERV CO OF COLORADO	NORTHEASTERN	4	450	6/1980	2021/2029	1900/1900
COLO	GRAND RIVER DAM AUTH	STEAM PLANT	1	400	6/1981	1900/ C	1900/ C
COLO	FARMERS ELEC COOP	UNNAMED	1	350	6/1982	0/ 0	1900/ C
COLO	COLORADO GAS & ELEC	UNSITED	1	515	6/1983	C/ 0	1900/ C
COLO	COLORADO GAS & ELEC	UNSITED	2	515	6/1984	C/ C	1900/ C
COLO	COLORADO GAS & ELEC	UNSITED	3	515	6/1985	C/ C	1900/ C
COLO	COLORADO GAS & ELEC	UNSITED	4	515	6/1986	0/ C	1900/ C
COLO	FARMERS ELEC COOP	UNNAMED	2	350	7/1986	0/ 0	1900/ C
TEX	SAN ANTONIO PUB SERV BD	COLY	1	410	2/1977	1900/1900	1325/1325
TEX	SOUTHWESTERN ELEC PWR	WELCH	1	520	2/1977	1470/1470	1750/1750
TEX	TEXAS PWR & LT	MARTIN LAKE	1	750	3/1977	4160/4160	3952/3952
TEX	SAN ANTONIO PUB SERV BD	COLY	2	410	7/1977	1900/1900	1325/1325
TEX	TEXAS PWR & LT	MARTIN LAKE	2	750	2/1978	4160/4160	3951/3951
TEX	TEXAS PWR & LT	MONTICELLO	3	750	3/1978	3915/3915	3915/3915
TEX	HOUSTON LT & PWR CO	PARISH	5	650	3/1978	2410/2410	2410/2410
TEX	SOUTHWESTERN PUB SERV CO	HARRINGTON	2	317	6/1978	947/ 947	1089/ 980
TEX	TEXAS PWR & LT	MARTIN LAKE	3	750	2/1979	4160/4160	3951/3951
TEX	HOUSTON LT & PWR CO	PARISH	6	650	3/1979	2410/2410	2410/2410
TEX	LOWER COLO RIVER AUTH	FAYETTE	1	550	6/1979	2000/2000	2000/2000
TEX	BRAZOS	SAN MIGUEL	1	400	12/1979	3000/3000	3000/3000
TEX	CENT PWR & LT CO	COLETO CREEK	1	550	1/1980	1900/1900	1900/1900
TEX	SOUTHWESTERN ELEC PWR	WELCH	2	520	2/1980	1470/1470	1750/1750

* The City of Natchitoches' Lampoc Plant will use coal as a feed stock for a low Btu synthetic gas process. The synthetic gas will be used in a combined cycle unit to generate electricity.

APPENDIX 10 (continued)

TABLE A10-1 (continued)

STATE AND REGIONAL LISTING OF NEW COAL UNITS
SCHEDULED FOR OPERATION BETWEEN 1977-1986

STATE AND GEOGRAPHIC REGION	UTILITY	PLANT	UNIT ID	CAPACITY (MW)	MONTH/YEAR ON STREAM	1981 CEPAC (1000 TONS) TOTAL/CONTRACTED	1985 CEPAC (1000 TONS) TOTAL/CONTRACTED
TEX	LCRA & CITY OF AUSTIN	FAYETTE	2	550	6/1980	2000/2000	2000/2000
TEX	SOUTHWESTERN PUB SERV CO	HARRINGTON	3	317	6/1980	379/ 379	1089/ 980
TEX	HOUSTON LT & PWR CO	PARISH	7	600	12/1980	2300/2300	2300/2300
TEX	TEXAS PWR & LT	MONTICELLO	1	750	1/1981	4000/4000	4000/4000
TEX	TEXAS PWR & LT	MARTIN LAKE	4	750	2/1981	3551/3551	3551/3551
TEX	TEXAS PWR & LT	GIBBONS CREEK	1	400	6/1981	2795/2795	2795/2795
TEX	HOUSTON LT & PWR CO	LIMESTONE	1	750	1/1982	0/ 0	2775/2775
TEX	TEXAS PWR & LT	TWIN OAK	1	750	1/1982	0/ 0	4000/4000
TEX	SOUTHWESTERN ELEC PWR	WELSH	3	528	2/1982	0/ 0	1750/1750
TEX	SOUTHWESTERN PUB SERV CO	SOUTH PLAINS	1	475	6/1982	0/ 0	1130/ 0
TEX	TEXAS PWR & LT	SANDOW	4	575	12/1982	0/ 0	3000/3000
TEX	TEXAS PWR & LT	TWIN OAK	2	750	1/1983	0/ 0	4000/4000
TEX	HOUSTON LT & PWR CO	LIMESTONE	2	750	1/1984	0/ 0	2775/2775
TEX	SOUTHWESTERN ELEC PWR	PIRKEY 1	1	600	2/1984	0/ 0	2000/2000
TEX	BRAZOS	SAN MIGUEL	2	400	12/1984	0/ 0	3000/3000
TEX	TEXAS PWR & LT	GIBBONS CREEK	2	400	6/1985	0/ 0	2795/ 0
TEX	TEXAS PWR & LT	SOUTH PLAINS	2	512	6/1985	0/ 0	1130/ 0
WEST SOUTH CENTRAL REGION		LIMESTONE	1	750	1/1986	0/ 0	3350/ 0
APSC	ARKANSAS PWR & LT	CROSSETT	2	250	6/1978	74C/ 74C	74C/ 74C
APSC	ARKANSAS ELEC PWR COOP	APACHE	2	175	10/1978	55C/ 55C	55C/ 55C
APSC	ARKANSAS ELEC PWR COOP	APACHE	3	175	4/1979	55C/ 55C	55C/ 55C
APSC	SALT RIVER PROJECT	CORONADO	1	350	4/1979	1100/1100	1100/ 900
APSC	ARKANSAS PWR & LT	CROSSETT	3	350	6/1979	74C/ 74C	74C/ 74C
APSC	SALT RIVER PROJECT	CORONADO	2	350	4/1980	1100/1100	1100/ 900
APSC	ARKANSAS PWR & LT	CROSSETT	4	350	6/1980	1035/1079	1079/1079
APSC	ARKANSAS PWR & LT	CROSSETT	5	375	6/1983	0/ 0	720/ 0
APSC	TEX ELECTRIC SER & ELEC CO	SPRINGERVILLE	1	330	5/1985	0/ 0	1000/1000
CELC	CELANESE LTD	CAMIE	1	380	4/1978	1200/1200	1200/1200
CELC	CELANESE LTD	CAMIE	2	380	4/1979	1200/1200	1200/1200
CELC	CITY OF CELANESE SPRINGS	ALAMO	1	200	6/1980	850/ 850	850/ 850
CELC	PUB SERV CO OF CELANESE	PAMPA	1	500	7/1980	1725/1729	1729/1729
CELC	CELANESE LTD	CAMIE	3	447	4/1982	0/ 0	1200/ 0
CELC	CELANESE LTD	CAMIE	4	447	4/1983	0/ 0	1200/ 0
CELC	PUB SERVICE CO CELANESE	SOUTHPOST	1	500	4/1984	0/ 0	1730/ 0
CELC	PLAINS PWR& PWR ALTO	PAMPICO	1	200	6/1984	0/ 0	500/ 0
CELC	CITY OF CELANESE SPRINGS	ALAMO	2	200	11/1985	0/ 0	850/ 850
CELC	PUB SERVICE CO CELANESE	SOUTHEAST	2	500	4/1986	0/ 0	1730/ 0
PSCO	TOC PEARSON PWR CO	COLLSTRIP	3	700	11/1981	2833/2833	2833/2833
PSCO	TWO PEARSON PWR CO	COLSTRIP	4	700	5/1982	0/ 0	2832/2832
ARIZ	SOUTH PACIFIC PWR CO	VALLEY	1	250	5/1981	700/ 0	700/ 0
ARIZ	SOUTH PACIFIC PWR CO	VALLEY	2	250	5/1984	0/ 0	700/ 0
ARIZ	NEVADA PWR CO	ALLEN	1	500	6/1985	0/ 0	2885/2885
ARIZ	NEVADA PWR CO	ALLEN	2	500	6/1986	0/ 0	2885/2885
D P	PUB SERV CO OF D P	SAN JUAN	3	400	5/1979	1500/1500	2017/2017
D P	PUB SERV CO OF D P	SAN JUAN	4	400	5/1981	2017/2017	2017/2017
D P	PUB SERV CO OF D P	NEBO	1	500	1/1982	0/ 0	2200/ 0
LTDP	LTDP PWR & LT	PLANTERSVILLE CANYC	1	415	4/1978	800/ 800	800/ 800
LTDP	LTDP PWR & LT	EMORY	1	400	6/1978	800/ 800	800/ 800
LTDP	LTDP PWR & LT	EMORY	2	400	4/1980	800/ 800	800/ 800
LTDP	LTDP PWR & LT	EMORY	3	400	6/1983	0/ 0	800/ 0
LTDP	NEVADA PWR CO	WARNER VALLEY	1	250	6/1983	0/ 0	1450/1450
LTDP	NEVADA PWR CO	WARNER VALLEY	2	250	6/1984	0/ 0	1450/1450
LTDP	LTDP PWR & LT	EMORY	4	400	6/1985	0/ 0	800/ 0
LTDP	A B UTAH & PWR	DELAMATER	1	820	1/1986	0/ 0	2200/ 0
WPC	PACIFIC PWR & LT	WYODAK	1	330	5/1978	1000/1000	1000/1000
WPC	PACIFIC PWR & LT	BRIDGER	4	500	12/1979	1600/1600	1600/1600
WPC	MONTA ELEC COOP	LARAMIE RIVER	1	500	4/1980	2450/2450	2450/2450
WPC	MONTA ELEC COOP	LARAMIE RIVER	2	500	9/1980	2450/2450	2450/2450
WPC	MONTA ELEC COOP	LARAMIE RIVER	3	500	5/1983	0/ 0	2450/2450
MOUNTAIN REGION							
COLO	PUBLIC S & E	PUEBLO	1	200	7/1984	0/ 0	2100/1050
COLO	PUBLIC S & E	PUEBLO	2	200	6/1985	0/ 0	2100/1050
CNP	PUBLIANC GENERAL ELEC	BEARPAW	1	500	7/1980	1200/1200	1200/1200
NOSP	-	-	-	-	-	-	-
PACIFIC REGION							

APPENDIX 10 (continued)

ADDENDUM

Appendix 11 was erroneously left out in the printing of this publication, and has been included in this addendum.

COMPARISON WITH LAST YEAR'S STUDY ON NEW COAL-FIRED UNITS*

The period 1977-1985 is common to last year's report* and to this report. A comparison of the data sets of the two reports for this common period enables us to identify shifts in scheduled start-up dates and to obtain a better understanding of the rate at which new units are securing their coal supplies.

Last year's report identified 104,301 MW of new coal-fired capacity which was scheduled to come on-line from 1977 through 1985. At the end of 1985 these units would demand coal at an annual rate of 334.8 million tons. According to utility reports, 66.8 percent of that coal demand had an assured supply. One year later, 4,982 MW had been cancelled. The remaining 99,319 MW would require 320.6 million tons of coal annually by the end of 1985. Because most of the cancelled units were without an assured supply of coal, the level of assurance on the coal supply for the remaining 99,319 MW was a little higher with 67.1 percent under contract (as of October 1976). One year later (October 1977) the same 99,319 MW had increased the tonnage under contract to 76.4 percent of the total 320.6 million tons of annual coal demand for this capacity (see Table A11-1).

While 4,982 MW of capacity was cancelled another 22,743 MW of new capacity, which had not been announced by the utilities at the time of last year's report, has now been scheduled for the 1977-1985 period. Table A11-2 identifies the initial new capacity, subsequent cancellations and additions, and net capacity additions for the 1977 through 1985 time period. As a result of the additional new capacity projected for a 1977-1985 start-up the net capacity increased to 122,062 MW. The changes in projected capacity additions vary regionally. As shown in Table A11-2, as a result of these changes all geographic regions are gaining some capacity except the West South Central Region which will have a net loss of 962 MW and the New England Region which is not planning any coal-fired capacity. Generally, the bulk of the new incremental additions is to take place in regions east of the Mississippi River.

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* Last year's report, titled "Status of Coal Supply Contracts for New Electric Generating Units, 1976-1985," was published by the FPC in January 1977.

Table A11-1

CHANGES IN COAL SUPPLIES FOR NEW UNITS* SCHEDULED FOR INITIAL OPERATION DURING THE PERIOD 1977-1985, AS REPORTED IN THE FIRST STUDY IN THIS SERIES**

	October 1976 Data Set		October 1977 Data Set	
	(1)	(2)	(3)	(4)
Consuming Regions	Annual Tons of Coal Demand (10^6 Tons)	% of Coal Demand Assured	Annual Tons of Coal Demand (10^6 Tons)	% of Coal Demand Assured
New England	-	-	-	-
Middle Atlantic	15.1	28.5	15.1	28.5
East North Central	41.0	48.6	41.0	64.5
West North Central	63.2	83.6	63.2	87.5
South Atlantic	22.6	32.5	22.6	58.5
East South Central	21.8	55.3***	21.8	46.6***
West South Central	117.1	78.[illegible]	117.1	85.4
Mountain	38.6	65.0	38.6	89.1
Pacific	1.2	100.0	1.2	100.0
U. S. Total	320.6	67.1%	320.6	76.4%

* There are 99,319 MW of new coal-fired capacity which are common to last year's study and this year's study.

** Status of Coal Supply Contracts for New Electric Generating Units, 1976-1985. Staff report by the Bureau of Power, Federal Power Commission, January 1977.

*** The drop in assured coal supplies in the East South Central Region is due to the loss of 2.1 million annual tons of coal under contract for the Alabama Power Company's Miller plant in which the supplier stated that he could not meet the terms of the established contract. The case is presently in litigation.

Table A11-2

CHANGES IN PROJECTED NEW CAPACITY ADDITIONS, 1977-1985

Consuming Regions	(1) Initial Projection of Capacity Additions (as of 10/76)	(2) Cancellations (as of 10/77)	(3) New Capacity Additions Not Projected on Last Year's Report (as of 10/77)	(4) Net New Capacity Projections (as of 10/77) (4)=(1)-(2)+(3)
New England	-	-	-	-
Middle Atlantic	5,468	0	1,276	6,744
East North Central	17,484	632	3,878	20,730
West North Central	17,227	0	2,447	19,674
South Atlantic	10,920	0	3,446	14,366
East South Central	9,058	0	5,389	14,447
West South Central	30,327	1,700	738	29,365
Mountain	13,317	2,650	3,969	14,636
Pacific	500	0	1,600	2,100
U. S. Total	104,301	4,982	22,743	122,062